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MANUAL

OF

GENERAL THERAPEUTICS.

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A MANUAL
OF
GENERAL THERAPEUTICS;
WITH
RULES FOR PRESCRIBING,
AND A COPIOUS
COLLECTION OF FORMULÆ:

BY

D. SPILLAN, M.D., A.M.

FELLOW OF THE KING AND QUEEN'S COLLEGE OF PHYSICIANS
IN IRELAND.

"Medicine consists entirely in the science of indications, the first and most important of which is the knowledge of the seat and nature of the disease to be treated."—*Clin. Med. par Rostan.*

"The physician should generalize the disease as much as possible, and individualize the patient as much as possible."—*Hufeland's Lehrbuch der Allgem. Heilk.*

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TO

A. BILLING, ESQ. M.D. A.M.,

MEMBER OF THE SENATE OF THE UNIVERSITY OF LONDON,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,

&c. &c. &c.

A MAN NOT MORE DISTINGUISHED

FOR

GREAT PROFESSIONAL TALENT AND ELEVATED RANK

AS A PHYSICIAN,

THAN

FOR HIS MANY PRIVATE VIRTUES AND REFINED TASTES

AS AN

ACCOMPLISHED GENTLEMAN AND ELEGANT SCHOLAR,

THIS BOOK,

A SINCERE, THOUGH INADEQUATE, TOKEN OF

ACKNOWLEDGMENT FOR VERY MANY ACTS OF KINDNESS,

IS

GRATEFULLY INSCRIBED

BY

HIS SINCERE FRIEND,

THE AUTHOR.

ADVERTISEMENT.

The object which the author had in view in compiling this work, has been so fully explained in the first chapter, as almost entirely to obviate the necessity of a formal preface. His aim has been to establish the principles of Therapeutics on rational grounds, as far as that can be accomplished in the present state of Medical Science. Truth, however, obliges us to confess that our knowledge of the treatment of most of the diseases usually consigned to the care of the physician, is rather empirical than rational. In this particular it is that Surgery has the decided advantage over Medicine. When the surgeon has to treat a fracture, dislocation, or external inflammation, the indications of cure, and the rationale of the treatment to be adopted, are at once equally obvious and simple. No one can here be at a loss in connecting the lesion to be remedied with the therapeutical means to be resorted to: the entire process of treatment is decidedly *rational*: can the same thing be said with respect to the treatment of many of the diseases which fall under the cognizance of the physician? We fear not. We know the value of mercury in the treatment of syphilis, of tartar emetic in pneumonia, and of colchicum in gout; such knowledge, however, is confessedly *empirical.* We cannot connect the action of these substances with the lesion, to the removal of which they are adapted. We know from experience that they are useful; we do not know why. It is to be hoped, however, that as our knowledge of the nervous system becomes more fully developed, this opprobrium medicinæ will gradually lessen and be ultimately removed.

When men will set about investigating the relations between the pathological condition of internal organs and the action of medicinal substances, as also the dependence of the secondary or therapeutical action of such substances on their primary or physiological effects, with the same enduring zeal, unwearied energy, and powerful talent, as have been displayed by Laennec, Andral, Louis, Graves, Stokes, Forbes, Billing, Bright, C. J. B. Williams, and many others, in investigating the various lesions to which internal organs are liable, and in establishing the diagnosis between them, then, but not till then, can we fairly lay claim to the possession of anything like a perfect and complete system of RATIONAL THERAPEUTICS.

THERAPEUTICS.

CHAPTER I.

Therapeutics defined—Divided into general and special—Objects of each—Their study differs from that of the Materia Medica—Fallacies of a merely empirical knowledge of the effects of remedies—Sources of these fallacies—Physiology and Pathology necessary to Therapeutics—Real nature of disease—Morbid lesions, as they exist in the living body, the proper object of Therapeutics—Knowledge necessary to constitute a good practitioner—Objection that a distinct work on Therapeutics is not necessary, answered—Vis medicatrix—Dangers of a too implicit confidence in it.

By Therapeutics is meant that department of medical science which treats of the cure or palliation of disease.* Like Pathology, it is divided into general and special. General Therapeutics contain the general principles and rules to be observed in the treatment of disease, whilst Special Therapeutics give rules for the treatment of particular diseases, and applies to them the doctrines inculcated in the department of general Therapeutics. This branch of science was formerly combined with Materia Medica, and its improvement and cultivation were consigned almost exclusively to observation and experience. The science of Therapeutics, however, differs from that of the Materia Medica, both in its end and in the object of its research. Materia Medica merely collects those natural substances which have been found useful to the physician, and describes their physical characters and chemical composition. The science of Therapeutics observes man in the state of disease, ascertains the laws to be followed in the employment of those methods of cure which have been dictated by reason, deduced from the principles of Physiology and Pathology, and sanctioned by judicious and well-trained experience. Though it must be admitted that there are certain first principles of Therapeutics which could only be known by observation and empiricism, and could never have been deduced *à priori*, still there are numerous cases wherein the influence of remedial agents can be explained and satisfactorily accounted for by a reference to the established principles of Physiology and Pathology. The errors and serious fallacies, to which a merely empirical observation of the effects of remedial agents would lead, will at once appear, if we but consider the great variety in the individual cases of disease, no two of which are exactly alike in all the concomitant circumstances; such variety must obviously modify the effects of remedial agents. Again, let us take into account the actual tendency which most diseases have to re-establish the healthy state, so that what we consider to be effected by our treatment may be the work of nature. Another source of fallacy is the influence of external causes in producing results which we may be disposed to ascribe to the remedial agents employed by us. Hence we see the great importance of endeavouring to correct the conclusions drawn from individual cases of disease, and the great necessity of directing our mode of treatment by reference to the principles of physiology and pathology, and by carefully observing the immediate effects of remedies on the healthy body.

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* Sed et curatio duplex est; una quidem omnia agere, quo pars affecta ad sanitatem perducatur; altera vero eam adhibere providentiam quæ affectui congruat, hoc est ipsum mitiget ac demulceat.—Galeni Commentar. in Hippocrat. Aphor., sect. vi. 38.

Thus we see that to a knowledge of Therapeutics, an intimate acquaintance with physiology and pathology is essentially necessary. Physiology observes man in the healthy state, and traces the laws according to which the several functions of the body are performed. Pathology directs attention to the causes which change the structure and derange the functions of the different organs, investigates the nature of such changes and derangements, and observes the phenomena accompanying them, The science of Therapeutics next comes in, and, guided by the knowledge previously derived from physiology and pathology, it establishes the various indications to be fulfilled, and determines the method necessary for restoring the system to its healthy state. The insufficiency of a knowledge of mere symptoms is now acknowledged on all hands. Diseases are now known to depend on lesions of certain tissues or organs. The modern therapeutist, directed by the lights of modern pathology, studies the nature, character, and product of these lesions, and considers the symptoms no farther than as enabling him to arrive at a knowledge of the seat of the pathological lesion producing them, and the structural alteration of which they are but the expression. The lesions, however, sought by the therapeutist, are not exactly those presented by the dead body; such lesions have reached their final termination, and have passed the limits within which the resources of medicine could effect any good. We must be aware, therefore, that in the lesions found in the dead body, many pathological elements have disappeared which kept up several of the symptoms, both direct and sympathetic, in the relief of which medical treatment may have been available. Death has now substituted icy coldness for those exaltations of temperature observable in several parts of the living body, and the cause of so much distress to the patient ; paleness has now taken the place of inflammatory redness ; where there was tension, there is now absolute laxity of parts. Several pathological phenomena observable on the living body, and which might have claimed the attention of the practitioner, and furnished him with useful indications, are now gone. Thus, then, it is not alone the lesions found on the dead body, but those also revealed by the symptoms, and accounted for by the laws of physiology and pathology, which the therapeutist should study, as it is these he is called on treat.

Nor is a knowledge of the lesions alone sufficient to constitute a practical and scientific physician ; he must possess a thorough knowledge of the remedies to be employed for their removal : the physiological action of remedies, the immediate effects produced by them on the living body, must be carefully ascertained by him ; he must be able to appreciate their power over the organs affected, and their control over their functions ; he should know the nature, duration, and extent of their action, and the different changes and modifications which they may produce in the system. This power it is which renders them fit to counteract disease, and accordingly the therapeutist should have carefully ascertained it. Remedies have been called, and justly called, the instruments whereby the physician is to combat the aggressions of disease ; it is obvious, therefore, that in order that he may handle them dexterously and employ them successfully, he must understand their nature, the extent of their power, as also the nature of the object on which he is about to use them. Medicine will then have attained its highest point of excellence, when it can clearly demonstrate the nature and extent of the lesion which it has to relieve, and when it can always justify the exhibition of the remedies which it employs for the removal of this lesion by reference to their primary action, and by the organic changes which they are calculated to produce.

It may be said that a distinct work on Therapeutics is superfluous, in as much as every work on the practice of medicine, after the description of each disease, its causes, symptoms, &c., contains also rules of treatment. The precepts, however, so given, are unconnected and dispersed, and, in fact, altogether insufficient to guide and direct the practitioner at the bedside of the patient. This method also is not only more harassing, but it also occasions a great loss of time, by the necessity which it induces of repeating the same class of medicines after each disease; another objection to it is, that it addresses itself only to the memory: the young practitioner, after learning by rote all the modes of treatment recommended for a disease, will think that his qualification to treat it is in a direct ratio to the number of such modes which he has committed to memory. Nothing, however, is more false. It is not the knowledge of a great number of therapeutic means that forms the physician; it is the knowledge of the opportunity, the knowledge of the indication, which alone distinguishes the real physician from the impudent and barefaced quack, who, having learned by rote the names of a number of remedies, will, on hearing the mere name of a disease, confidently propose his mode of treatment, without the least reference to the state of the patient on whom he may be consulted. In fact, with such a person, diseases, such as pleurisy, rheumatism, peritonitis, &c., are real entities, wholly independent of the individuals affected by them. Wherefore it is of the utmost importance to collect the general principles of medical treatment, and to arrange them according to their analogies, to note the mode of action of each class of medicinal substances, and the circumstances under which the practitioner should employ the remedial agents contained under it. It is also necessary, after having deduced the curative indications which the disease presents, by referring to the principles of pathology, to develope the laws according to which the physician should proceed, so as to apply the various therapeutic means in the manner the most rational, and the best calculated to produce successful results.

There has been observed in every living body, as well in the vegetable as in the animal kingdom, an instinctive principle, the constant tendency of which is to preserve the body in the healthy state by repelling the action of morbific causes, and to restore the same body, when injured by external violence, or by causes existing within itself, to its pristine state of health and vigour. We see that when a branch is torn from a tree, the injury to the parent trunk is repaired by a process similar to that set up in the animal body, whenever a wound is inflicted on it. It is by the aid of this instinctive power or principle that we so frequently observe diseases removed without the intervention of art, or without even the slightest change being made in those external influences which may be supposed to have occasioned the disease; we often see diseases cured under the most opposite modes of treatment; and though it may not be fair to adduce all such cases of recovery in proof of the existence of this reparative power,* still when we repeatedly see diseases removed by methods of treatment not only different, but diametrically opposite, we cannot help suspecting that such cases are rather recoveries than cures; and accordingly, that if it be fair to infer the existence of a power or principle from its obvious effects, the reality of the principle in question can scarcely be denied. This power, we know, was universally acknowledged by the old practitioners under various titles: it constituted the *anima* of Stahl, the *archæus* of Vanhelmont; and though the moderns are not so much disposed as their predecessors to embody the refined abstractions of metaphysical philosophy, there is some reason for thinking that this same principle is still recognised in practical medicine, *mutato nomine*, under the new designation of *re-action.* Accordingly, though the existence of this power cannot be denied, we must still beware of attaching too much importance to it. During health we see all the vital actions go on regularly, and with the due degree of energy; they succeed each other, and are connected so intimately, that the organs, exercising on each other a sympathetic influence appropriate to their wants, contribute to perpetuate the equilibrium between the functions. But when the animal system is subjected to the action of morbific influences, this equilibrium is disturbed and destroyed, and another series of actions presents itself to our observation. We frequently see that the disturbance then occasioned in the animal and vital functions manifests a tendency to increase, and that the vital actions, so deranged in the several tissues and organs of the body, evince a disposition to produce phenomena which must ultimately terminate in disorganization of the parts affected, and in the cessation of life. In such cases, what becomes of this conservative principle so much boasted of? what confidence can be reposed in it, when we see the animal frame, disturbed in one or more of its organs, advancing with rapid strides to utter destruction? Let a man labouring under common catarrh or bronchitis, have an attack of epistaxis, or a profuse sweating, and then recover, and we shall soon hear the vis medicatrix naturæ applauded to the skies; but let the hæmorrhage, so beneficial in this case, and which is so gratefully attributed to the kindness of the conservative principle, take place into the brain or lungs, and then we shall not hear one word of the principle in question.

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* We readily acknowledge that the cure of a disease may be effected by very different modes of treatment. If such cures be examined, however, the difference of treatment will be found to be rather apparent than real. On this subject see Dr. Billings' First Principles of Medicine, Advertisement to third edition, et passim.

The errors of placing too much confidence in the vis medicatrix would be unimportant, if they were confined to mere medical speculation; but the truth is, they would, if acted on, lead to serious and disastrous consequences. The ardent sticklers for the autocracy of nature in resisting and removing disease tell us we must beware of disturbing Nature in her course, or of opposing her efforts; the most alarming symptoms are, according to them, occasioned by her struggle with disease, and must be most profoundly respected by us. Such theory, however, is wholly inapplicable to the great majority of cases. If we could at the commencement of each instance of disease ascertain by any means, or distinguish by any sign, those cases which may be safely consigned to the exclusive care of Nature, and which will be cured by crisis, from those where the intervention of art may be necessary, such reasoning may be listened to; but no such sign can be obtained; we must accordingly beware of adopting a system of inaction, which may have the effect of allowing full time to the lesions of vital organs to become more severe, and so induce consequences of the most distressing character.

The question, whether the expectant or active method of treatment should be preferred, reduces itself simply to this, whether we ought or ought not to excite changes in the functions, when the organs performing them are the seat of lesion. To this we answer, that the active method is to be preferred; for in all diseases the issue being uncertain, and the critical efforts being sometimes productive of serious consequences, it would be dangerous, nay inhuman, to consign the body a prey to disease and pain, in expectation of the developement of a crisis, more especially when we possess means of re-establishing health more promptly and with more certainty. The activity and nature of the treatment should of course vary with the intensity and nature of the lesion. Sometimes it should be active and determined, when the case is urgent; sometimes it may be confined to removing the causes of disease, by the judicious use of hygienic means, and the employment of simple and mild medicines.

Nor are these principles at variance with the precepts and practice of the great physicians of both ancient and modern times, whose maxims have been tested and verified by long experience. Thus, when in acute disease we observe signs indicating salutary efforts, as, for instance, a displacement of the irritation to the kidneys, integuments, or to the intestinal canal, the judicious and experienced physician will at once see that he has nothing else to do but to favour these movements. If the symptoms of disease are slight, and the evil is likely to disappear spontaneously, we must, of course, abstain from active treatment—yet in such cases the physician is not really passive; he observes the phenomena as they present themselves, and modifies the animal organism by carefully directing and judiciously favouring the tendency, ascertained by him, to the re-establishment of health.

CHAPTER II.

Indication what—Various significations of the term—How established—Variously denominated, according to source—Ind. empirical, rational, fundamental, occasional, and symptomatic—Definition—Instances of each—Condition necessary to establish indication—The ultimate end and aim of anatomical, physiological, and pathological knowledge—Bases of indications vary with the peculiar theories of the practitioner—External phenomena of disease, how far useful—Proper basis of curative indications.

THE term *indication*,* or, as it is sometimes qualified, *curative indication*, has been used in various senses by medical writers. Some define it to be the end or object which the medical practitioner endeavours to accomplish by the remedial agents which he employs. Others, again, have defined it to be the knowledge which the physician has acquired with respect to the treatment of a disease, by the methodical examination of the different organs of a patient, and by the investigation and due examination of the circumstances which have preceded the disease.

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* Out of the examination of the patient, and of all those matters which may have influence on him, there arise certain circumstances which point out or *indicate* to the physician what he has to do, what change he has to effect in the body of the patient, or what plan he should project for the treatment of the disease. Everything appertaining to these circumstances, or to the grounds which may determine him to adopt such a method of treatment, whether it respects the present, the past, or the future; whether it is to be found within the patient or is external to him, is called the matter *indicating* (*indicantia*). The judgment or determination of the physician deduced from those matters so indicating, with respect to that which art may have to perform, and in reference to the kind of change to be effected in the patient, is called the *indication*. The means whereby these indications may be carried out, is generally called the thing *indicated*.—See *Conradi Handbuch der Allgemeinem Therapie*. sec. 26.

To establish an indication, (we here use the term in the latter sense,) the physician must take into account all the pathological phenomena presented to him; he must examine them all successively; accurately determine their absolute or relative value; he must determine the state of each organ and each function in particular: then, from the accurate appreciation of the causes of the disease, he must descend to the exact estimation of the effects they may have produced; and by this mode of proceeding, he comes to attain a knowledge of the nature and state of the disease, and thus deduce from this knowledge the means of treatment likely to prove most available.

Indications have received various denominations, according to the sources whence they have been derived. They have been called empirical, rational, fundamental, occasional, and symptomatic.* Thus, in the treatment of syphilis, or of intermittent fever, the physician can, generally speaking, proceed only by empirical indications, that is, indications which are based solely and exclusively on experience; whereas, in pneumonia, peritonitis, and, in fact, in all inflammations of organs, the indications are rational; that is, the character and nature of the inflammation being well known, reason points out the antiphlogistic method of treatment, the good effects of which in such affections are equally well known.

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* Various other species of indications are mentioned in the writings of some German pathologists: thus, according as our insight into the nature of diseases, into the conditions of their cure, and the modus operandi of remedies, is more or less perfect or imperfect, the indications also are more or less certain or uncertain, or only conjectural. But though a rational practice on the part of the physician must be founded on certain and sure indications, yet, in consequence of the still imperfect state of medical science, he is often obliged to act on *conjectural indications.* Other indications, derived from the good or bad effects of various substances, have been called *indicationes ex juvantibus et lædentibus:* the empirical indications adopted by us partly correspond with those. There are, again, the *vital, causal,* and other species of *indications,* frequently alluded to in the works of continental writers, but which, for obvious reasons, we shall abstain from further noticing. From the explanation given of the term *indication,* the import of the term *contra-indication* will be readily understood.

By symptomatic indications are meant those furnished by the predominance of one or more symptoms in a disease of which little is known: such are the bases of what is called symptomatic medicine, or the medicine of symptoms. In some cases these are the only indications which the physician has to guide him, either for want of sufficient information regarding the previous history of the patient, or from the interest which the patient and his friends may have in concealing the real state of the case; or, as sometimes happens, from the advanced stage of the disease. We shall presently see that the acute or chronic form of the disease, as also the age, sex, temperament, &c. of the patient, introduce modifications in the several indications, which cannot be brought under any rule, and can only be appreciated by the experience and sagacity of the physician.

By fundamental indications, those are understood which are derived immediately from the exact knowledge of the nature, causes, and course of the disease. For instance, a lady, of thirty-six years of age, suddenly meets a gentleman for whom she entertained a very ardent affection, and whom she had not seen for a very considerable time; the unexpected meeting produces a powerful effect on her, and causes a suppression of the menses, which happened to be flowing at the time. Some time after the shock, &c. she fainted; when visited by her physician on the next day, her pulse was full and frequent, her face was flushed, skin hot, every object in her chamber seemed of a red colour; her mind was a good deal disturbed, and violent spasmodic and convulsive movements were observed to occur: in this case the obvious and fundamental indication was to draw blood, which, being followed by sedatives, soon restored the patient to the healthy state.

By occasional indications are meant those which arise from some change in the character of the disease, or from some additional occurrence supervening in the course of a disease. Thus, should hæmoptysis, with pain of side and dyspnœa happen during the course of a bronchitis, the occasional indication is to employ local or general blood-letting. Indications of this kind are of very frequent occurrence in the practice of medicine.

Whenever, from any cause, the physician cannot obtain sufficiently accurate details of the previous history of a case, so as to be able to deduce from them the fundamental indications, all that remains for him to do is to combat the most prominent and formidable symptoms; this is, as we have already noticed, the old symptomatic practice of medicine. The practitioner is often reduced to this extremity in many diseases of doubtful and obscure origin, concerning which he has no positive information. For example, a patient is brought into hospital with the following symptoms: face pale, pulse weak, no fever, skin not hot, intelligence and speech gone; no information can be obtained of the previous history of the patient—stimulants are administered for the purpose of arousing him—in six or eight hours after he dies. Another example: a woman thirty-four years of age is admitted into hospital, labouring under a catarrhal affection; after being in the hospital for a short time, she suddenly complains of violent constriction of the chest; her face becomes of a purple colour—total loss of speech and intelligence—the appearance of the face indicated blood-letting—

it was performed, and she dies soon after, discharging large quantities of blood by the mouth. On opening the body, there was found intense pulmonary congestion. In these two cases the practitioner could act only from symptomatic indications, which were here of rather an uncertain character; in the one case suitable treatment was employed, and in the other a treatment not at all suitable to the real nature of disease.

With respect to the conditions required for establishing the necessary indication, the practitioner should never fail to investigate the causes which may have led to the developement of the disease. We have seen the case of a young man, who, after the disappearance of a long running sore, was seized with pains in the bowels, diarrhœa, and vomiting; the last symptom continued with unceasing violence, and reduced the patient to the last stage of marasmus. He consulted a celebrated practitioner, who, on ascertaining the previous history of the case, at once perceived the necessary indications. He applied a blister to the part which had been previously the seat of the sore. and in twelve hours after the vomiting ceased, and appetite for food returned: the blister was kept open for two months, and the patient perfectly recovered.

The great end and aim of all anatomical, physiological, and pathological knowledge, as well as of the various medical theories which have been broached at different times, has obviously been to perfect and render more certain the treatment of disease. Still there is no department of medical science which has proved more obstinate or rebellious to the yoke of systems. or has lent a more powerful and effective arm to destroy them, than the science of therapeutics. This circumstance, if minutely examined, will not appear at all extraordinary to the judicious reasoner. Great erudition, accompanied by an ardent imagination, will enable men to argue plausibly, if not to reason accurately, and so to lead away superficial and weak minds.

At the bedside of the patient, however, matters are entirely changed. In the presence of nature, discussion is of far less value or importance than action; and the results of clinical practice will plead far more eloquently for the physician's talent and tact than the most brilliant discourse. Thus, then, therapeutics are the real touchstone of all medical theories, and it is by the number of cures performed, and not by the eloquence or ingenuity of the theorist, that the value of his system is to be appreciated.

The bases of the curative indications must, of course, vary with the theory espoused by the practitioner. Thus, the humoral pathologist will found his indications on correcting the acrimony of the humours; the Brunonian will give stimulants to recruit the strength of the patient, and remove the state of debility, which may, in reality, be only apparent, and the result of some internal visceral inflammation. Some practitioners will attend only to the most prominent symptoms as they may arise; such symptomatic medicine, however, has been found by the lights of modern pathology to be as absurd in principle as ruinous in practice. Such a practitioner will treat headache arising from gastric inflammation or gastric disturbance, in the same manner as that caused by encephalitis. Other practitioners, again, view diseases as groups of symptoms more or less numerous, to which they oppose curative methods sanctioned by experience. Such groups of symptoms, however, in order to form characteristic signs of diseases, and to be qualified for forming the basis of curative indications, should be uniform, and should succeed each other in an unvarying order. This, however, is not the case; there is nothing so fluctuating as this class of morbid phenomena, which vary with the constitution, age, temperament, &c. of the patient, as also with the treatment previously employed.

The external phenomena of disease, unless connected with the organs, whose sufferings they indicate, want a solid base, and leave in the mind vague and uncertain ideas. Some few of such symptoms may be fundamental and constant, when such or such an organ is affected; but, at the time they appear, various sympathetic accessory phenomena supervene, which depend on the relation established by the nervous system between the different organs.

To prescribe medicine according to the occurrence of some particular series of symptoms, is to act in the dark, as, in so doing, we neither know in what state the organs are on which we are to act, nor what is the nature of the lesion to be combated. Another class of medical practitioners say, that in many diseases, when such or such symptoms appear, such or such treatment answers; so that to cure, we have no need to know either how the organs are affected, or how remedies act. According to such persons, medicine will then be perfect, when, being given a certain number of symptoms of any disease, we can subjoin the names of the medicines calculated to cure it. If such a method of proceeding were the true one, the science of therapeutics would be mere routine, and as it is really for the sake of it all the other branches of medicine are studied, it would follow that anatomy, physiology, and pathology, are useless to the physician. For what use would such knowledge be to men always dealing with mere abstractions at the bedside of the patient; and who have no idea of the course, nature, or state of the disease, nor of the manner in which remedies act?

From what has now been said, it must appear obvious that the curative indications can have no other rational base than a profound knowledge of the nature of disease. The most important point to be attained in practice, is first to know in what the lesion of the affected organs consists. To solve this question, the causes of the disease, and the established laws of pathology, must be carefully interrogated, and it is only when no obscurity any longer exists in the mind of the practitioner that he can determine the indications to be fulfilled.

The nature of the disease, or species of vital modification producing external morbid phenomena, must therefore constitute the basis of our therapeutic indications. Let the same lesion exist in young, old, weak, or strong, in man or in woman, the treatment must be conducted on the same principles. The causes of the disease, its seat, the individual circumstances attending it, and the variety in the organization of the patient, bring no doubt important differences in the treatment; but the indications thence arising are but secondary and subordinate to those arising from the nature of disease; they may induce the practitioner to prefer one medicine, or one form of medicine, to another, but not to change the nature of the treatment. Thus, acute inflammation must be treated on antiphlogistic principles, no matter what may be its cause or seat, or what the strength or weakness of the patient may be.

These principles, founded as they are on the nature of things‘ allow us to trace the connexion which unites medical practice with physiological and pathological theory.

Having thus far considered the true basis of all medical indication, we shall briefly advert to the unphilosophical conduct of those practitioners, who, having espoused some favourite theory, which they allow to attain an unduly strong predominance over all their pathological reasonings, uniformly ascribe numerous diseases, apparently and obviously of a different character, to some one single cause, and so recommend one uniform practice in conformity with this theory: where, for instance, every sort of pain, in whatever part it may occur, every species of nervous irritation, is attributed to fulness or emptiness of blood-vessels, or to errors in the functions of the liver, stomach, duodenum, or bowels generally, and bleeding local or general, mercury, and purgatives, are recommended accordingly.

Again, some theorists will have it, that the head is the exclusive seat of fever, and that all the febrile movements observable in the system radiate from the inflamed brain as from a centre; while others insist on the mucous membrane of the stomach and bowels as the seat of this affection. How different the indications of cure will appear to these two classes of exclusives, it is unnecessary to mention. Mr. Abernethy again, to whom the science of surgery is so deeply indebted, had his favourite theory, on which he founded his treatment of disease. His theory was, we know, first, that all local affections are rather symptoms of a disordered constitution than primary and independent diseases, and that accordingly they are to be cured by remedies calculated to make a salutary impression on the constitution in general, rather than by local application; 2ndly, he considered that this disordered state of the constitution either arose from, or was closely connected with, derangement of the stomach and bowels, and that it can only be reached by remedies calculated to exert a salutary influence on these organs. The author, however, of the "constitutional origin and treatment of local diseases," has omitted to tell us what is the precise nature of these visceral derangements; little or no distinction is made between them, and the remedies universally applicable for the cure of all, lie within the narrow compass of a blue pill at night and black draught in the morning.

CHAPTER III.

Therapeutic indications derived from diseases—Morbid phenomena considered as therapeutic signs—Therapeutic signs derived from the morbid phenomena of the organs and functions of organic life—from the digestive organs—from the organs of circulation—of respiration—from animal heat—state of the skin—serous and sanguineous exhalations—secretions—urine—Therapeutic indications derived from the morbid phenomena of the organs and functions of animal life—attitude—appearance of the skin—of the countenance—indications from arterial pulsation—from the appearance of chest—and of the abdominal parietes—from the state of muscular power—from changes in the voice—in the general sensibility—from the state of the intellectual faculties—from the morbid phenomena in the genital organs and functions—Causes of diseases considered as therapeutic indications—Nature of diseases—Seat of diseases, as therapeutic indications—Course, duration, and periods of diseases, as therapeutical indications.

Therapeutic Indications derived from Diseases.

ALL pathologists are now agreed that diagnosis is the most certain of all curative indications, and our chief guide in pointing out the appropriate treatment of disease; still the practical physician will often find that *cœteris paribus*, there are other circumstances which induce the necessity of varying his treatment. These circumstances belong either to the disease itself, to the individual affected, or to external influences. Among the circumstances appertaining to the disease itself, may be enumerated its seat, causes, nature, progress, duration, periods, and the different aspects of the morbid phenomena ; among those apertaining to the individual, may be classed his age, strength, constitution, sex, habits, &c. ; and among external influences may be reckoned the various seasons, climate, dwelling-place, &c. We shall now consider these different bases of the rational treatment of diseases.

We shall commence this part of our subject by considering the therapeutic value of the different aspects of the various morbid phenomena.

It is well known that certain morbid phenomena possess in themselves a therapeutic value and signification ; some there are which induce the practitioner to adopt a certain line of practice in preference to some other ; there are others which only modify the treatment already employed ; whilst, again, there are others whose importance entirely depends on the diseases with which they are connected ; the latter are the most numerous.

Though we have taken some pains in endeavouring to prove that the most dangerous of all therapeutic methods was the medicine of symptoms, and that medicinal treatment founded on such miserable indications tended to the destruction of the patient, and the disgrace of the healing art ; still we must admit that it occurs but too frequently ; an accurate diagnosis on which all rational treatment should be based is wholly unattainable, and we are destitute of any other guide in the treatment of disease, save the functional phenomena ; again, in the greater number of diseases these functional phenomena vary, and by so varying, modify considerably the treatment to be employed. We shall now detail the dangers of the therapeutic indications derived from the symptoms, and the advantages which may accrue from them under certain circumstances.

1st. *Therapeutic signs derived from the morbid phenomena of the organs or systems of organic life.*

Desire of food. Appetite for food must not always be gratified: when it occurs in convalescence, as generally happens, we must take care that the patient indulge not too much, lest he may bring on a relapse. In acute diseases of a serious character, when patients are sometimes seized with a deceptive kind of appetite, it becomes still more necessary to beware of llowing them to indulge it, lest by so doing they accelerate the fatal termination already threatening them.

We may here remark the great precaution on the part of nature in annihilating all desire for food in acute diseases: the abstinence she enjoins in such cases is the most effectual means of preventing a supply of nutriment being conveyed nto the system, by which irritation may be kept up, and also of favouring the process of interstitial absorption, and hereby the resolution of diseases. So that this diminution of ppetite is a valuable indication, not to be lost sight of in the reatment of disease; there are, however, exceptions to this eneral rule; thus, in chronic diseases, we should endeavour o keep up the patient's strength by giving him food capable of xciting his languid appetite. The depraved appetite somemes observable in chlorosis, hysteria, amenorrhœa, &c., reuires careful watching, more especially when indigestible or oisonous substances are its object.

Thirst, which accompanies irritation more or less intense, ay be regarded as one of those conservative instincts left to s by nature. By this urgent feeling, she invites us to introuce into the body a larger portion of liquid than ordinary, oportioned, however, to the existing irritation. Great thirst in general accompanied by a desire of cooling drinks; and it is well known that, next to strict abstinence, there is no means of subduing irritation more effectual than that of introducing a large quantity of cooling fluids into the circulation.

Nor is the absence of thirst always a sufficient reason for not insisting on the use of liquids. When there exists a manifest state of irritation, indicated by heat of skin, strong and frequent pulse, and dry tongue, the absence of thirst may then be the result of delirium or insensibility, and therefore should not prevent us from making the patient drink.

The *tongue* next claims our attention as an organ affording us many valuable therapeutic signs. When it becomes of an extraordinary size, so as to endanger the patient's life by suffocation, deep scarifications often become necessary.

The diminution of size presents no other indications than the diseases which it accompanies. When the tongue is at the same time rough and dry, and this state seems attributable to the intensity of the irritation, we should insist on the use of diluents and antiphlogistic remedies.

Dryness of the tongue, accompanied by a smooth, shining, or rough and chapped appearance of this organ, indicates the propriety of antiphlogistic remedies; which are to be modified, however, by the other circumstances of the case, as such appearances indicate a violent inflammatory state of the system.

The yellow colour of the tongue observable in jaundice and chlorosis, can have no therapeutic value in itself; the indications are necessarily derived from the diagnosis; that is, from the knowledge of the organic cause which produces these symptoms.

The brown or black coating of the tongue is sometimes the result of concentration of strength; this state is soon relieved by the antiphlogistic treatment in the majority of cases When real debility is the cause, the opposite line of treatment is indicated. Here, again, we are reminded of the necessity of an accurate diagnosis, and of the fact that no one single symptom can suffice to point out the necessary plan of treatment.

Vomiting. When this is the sign of gastric irritation, of cancer of the stomach, or of strangulated hernia, we must of course avoid making the patient vomit, lest we aggravate his sufferings, and even occasion death.

When, however, vomiting is the result of simple indigestion, unaccompanied by any previous irritation, it may be advisable to promote it by means of tepid water; diluent drinks, and strict attention to diet, are then sufficient to effect a cure.

It may be stated that vomiting will possess a very different therapeutic value, when it depends on the diseases just now mentioned, and which all have their seat in the stomach, or on a disease of some remote viscus, such as the brain. It is almost unnecessary to remark that the quality of the substance vomited, as it frequently indicates the nature of the disease which occasions it, will often furnish correct diagnostic igns; it is obvious that the vomiting of blood and of simple limentary substances admits not of the same mode of treatment.

From the changes which occur in the functions of the intes- nal tube, and in the quality of the fæces, some therapeutic ndications may be derived; such signs, however, are of little alue when unaccompanied by other signs.

Constipation. It is of the greatest importance to distinguish hat the disease is which produces constipation. This will fur- ish us with a very striking instance of the indispensable necessity f diagnosis, as well as of the insufficiency of mere symptoms. or it is not sufficient to know that constipation exists, in der to decide on the utility of administering a purgative; it also necessary to know what the cause of this constipation is.

We remember a case of obstinate constipation attended by several medical practitioners. One of them, satisfied that every case of the kind depended on intestinal irritation, applied leeches upon leeches; still the constipation continued, and the patient became rapidly exhausted. Another, convinced that sluggishness of the intestines was the sole cause, prescribed drastic purgatives to no end, the result of which was severe colicky pains. One of the attending physicians, however, happening to be one of those practitioners who think that an accurate diagnosis is the only basis of external indication and of judicious treatment, took the trouble of carefully examining the abdomen, and discovered that a moveable tumour of considerable size compressed the rectum, and that, on making the patient lie on the right flank, this tumour fell towards the most depending part. He prescribed an enema to be administered to the patient in this position; the mechanical action of the injection dilated and distended the intestines, and the patient was soon relieved by copious evacuations. Hence it is evident that we should first determine whether the constipation is the result of irritation and inflammation, or of defective sensibility, occasioned by age, of compression by a tumour, of internal strangulation, &c., as the curative means to be employed cannot be the same under all these circumstances, antiphlogistics being applicable in the first case, purgatives and mechanical means in the latter.

The same remarks apply to *diarrhœa*. This symptom accompanies so great a number of diseases, that we cannot help feeling surprised at the absurdity of those who acknowledge the existence of certain medicines which have the property of arresting it. Surely the same medicine cannot be employed in the treatment of diarrhœa which results from inflammation, of that which follows the use of certain laxative substances, or of one which arises from some chronic disease of the intestinal mucous membrane, from cancer, or ulceration of the intestines; in a word, if it be critical, symptomatic, or colliquative, the same means cannot be employed.

With respect to tumours, which frequently manifest themselves on several parts of the abdomen, and which are sometimes useful in a diagnostic point of view, the first thing to be done is to examine into their cause and quality; as to whether they are formed by the accumulation of fæcal substances, by gases, by displacement of some viscus, by strangulation, by disorganization of the parietes of an intestine, by dilatation of some large vessel, or by the accumulation of a fluid; it is only after making such an examination, that we shall be enabled to prescribe the proper treatment.

Defecation, so far as it throws light on the diagnosis, may afford some indications of treatment. Thus the means to be employed in a case of difficult defecation will be different, if this symptom is connected with cancer of the rectum, with hæmorrhoids, tumours, syphilitic or other ulcers, abscesses, fistulæ of those parts, acute or chronic inflammation of the large intestines. The same may be said of tenesmus, and also of involuntary discharge of the fæces.

With respect to the quality of the evacuations from the abdomen, we may observe that their examination is a thing not to be neglected, as they often assist in the diagnosis, and consequently in selecting the best mode of treatment. Such treatment must vary according as the discharges denote inflammation of the intestines, or great debility and relaxation of those parts. Nor will the presence of blood in the stools always require the same mode of treatment, which must vary according as the sanguineous discharge is primary or consecutive, critical, symptomatic, supplementary, active, passive, the consequence of rupture of an hæmorrhoid, artery, vein, result of ulceration, &c.

Thus we have already seen sufficient instances to satisfy us that the diagnosis of diseases is the only rational basis of their treatment, and that, without an accurate knowledge of it, the practitioner skilled in the virtues of drugs is but a blind empiric.

Among the morbid phenomena which may serve as therapeutic signs, there are none more numerous than those afforded by the *organs of circulation.* These signs are so much the more useful as the circulation is more or less affected, in the great majority of diseases, there being but very few in which it does not undergo some changes; and even when it does not undergo any such, we may derive some valuable hints even from this negative circumstance.

Thus frequency of pulse is, generally speaking, a sign of irritation, and as such ordinarily indicates the antiphlogistic mode of treatment. There are cases, however, wherein this sort of pulse accompanies real debility, and it is only by taking the other circumstances into account, that the practitioner will be able to form a correct judgment.

A *rare pulse* generally denotes sinking of the vital powers, and accordingly indicates the propriety and necessity of a tonic, and sometimes a stimulating plan of treatment, generous diet, &c. There are, however, even to this rule some few exceptions.

In order, however, that these two qualities of the pulse now mentioned may have their full value, they should not be considered separately, but conjointly with the other qualities. If strength or hardness be joined to frequency, antiphlogistic measures are almost always indicated. If, on the contrary, weakness, softness, or rarity of the pulse be joined to frequency, considerable caution is required in the adoption of antiphlogistic treatment.

Thus we see that the *strength* of the pulse, as well as its *weakness*, form the most important characters for our therapeutic indications. Thus a *strong pulse* may be considered as the general index of powerful re-action, of violent irritation, and of the strength of the patient, and consequently as requiring the debilitating or relaxing mode of treatment. Still this rule is not without its exceptions. Thus, when the artery is superficial or cartilaginous, or when the heart is hypertrophied, this sign will lose much of its value. In the same manner the pulse may seem to be weak, and yet not really be so, if the artery be deep-seated, or if there be an obstacle to the course of the blood before the subclavian artery is given off. It is easy to see how important it is to distinguish these cases, so that we may not always prescribe the debilitating plan of treatment in the one case, and tonics in the other.

The *hard pulse* is perhaps, still more than even the strong pulse, a sign of intense inflammation and great reaction ; there is probably no exception to this law, except that species of hardness which depends on ossification of the arterial parietes.

Pulsations of the abdominal aorta are observed in some gastric inflammations, and denote great excitement, and therefore generally indicate antiphlogistic treatment.

Of the therapeutic signs afforded by the capillary circulation we shall speak presently, under the head of Sanguineous Exhalations, and when we come to consider the external habit of the body. The signs derivable from the venous circulation have but little value in themselves ; they indicate no other treatment but that suitable to the disease which they accompany.

The blood itself occasionally affords therapeutic signs, which, although of not much positive value when considered in themselves, yet, united to others, they may sometimes determine the physician in the choice of his treatment. Thus the buffy coat, generally denoting a plethoric state of the system, or the existence of inflammation, will indicate the debilitating plan of treatment. The more consistent the blood is, the richer it is, and the more are debilitating measures indicated ; whereas, if serosity predominate in this fluid, blood-letting must be suspended.

Œdema being in general but a symptom, it is to the disease which produces it that we must direct our attention.

The action of the heart affords a considerable number of morbid phenomena ; but as these belong to a variety of different affections, they cannot by themselves indicate any particular mode of treatment ; it becomes necessary to ascertain with what diseases they are connected. These disturbances in the movements of the heart are observed in hypertrophy, aneurism, carditis, pericarditis, hydropericardium, hydrothorax, and pulmonary phthisis; they also accompany the pressure of tumours on large vessels, as also ascites, ovarian dropsy, and, in fact, all those affections which oppose an obstacle to the free circulation of the blood. Oftentimes they are the result of the influence of the brain on the heart, and of a general plethoric state of the system. It is scarcely necessary to say, that the same treatment cannot be applicable to all these cases.

We next come to consider the functional derangements of the *respiratory organs*, and to see whether any therapeutic indications can be founded on them. The ancient physicians, destitute of the valuable light of pathological anatomy, had no other means of investigating and recognising diseases than by grouping together a certain number of functional phenomena, (symptoms,) and so embodying them, and investing them with all the importance of a real entity. Imagining that these functional disturbances depended invariably on the same organic lesions, they directed all their therapeutic means against this collection of symptoms ; nay, sometimes one single funcional disturbance constituted a disease, and was treated as such. Thus it is well known that every difficulty of breathing received the name of *asthma*, and for centuries a host of ridiculous and frequently of mischievous remedies were directed against this so-called disease. How absurd this must appear to the educated modern pathologist, who knows on what a variety of causes, mechanical, chemical, and vital, this symptom may depend! Surely, when it is considered that difficult, and its usual accompaniment, frequent respiration, may depend on rigidity of the parts concerned in respiration, such as ossification of cartilages, rickety distortions, tumours, and dropsies of the abdomen; tumours or fluids pressing on the air-tubes, spasm of the glottis, compression of the lungs by effusions or tumours in the pleural sac, as in pleuritis, hydrothorax, pneumo-thorax, aneurysm, &c., changes in the tissue of the lungs, either by effusion, as in œdema, hepatization, ubercle, &c., or by altered structure, as in emphysema, ilated bronchi, vomicæ, &c.; it will strike the most unthinkng person, that such a functional derangement cannot constiute a disease, and accordingly that the same plan of treatment annot be adopted in all those numerous cases wherein this ymptom may occur.

What has been said of frequency, may also be said of the *arity* of the respiration; it is necessary to know whether this ymptom depends on organic disease of the heart, or lung, or n extreme debility of the patient; in the former case its value ill be the same as that of the disease to which it belongs, hilst in the latter it concurs in pointing out the necessity of onic and revulsive medicines. With respect to the other arieties of deranged respiration, such as orthopnœa, intermitent, sighing, stertorous breathing, these can furnish no theraeutic sign of themselves; it is necessary to know the disease hich occasions them.

The qualities of the air expired, which so often afford us valuable information for prognosis, are not of much value with respect to treatment; it may be stated, however, that great heat of the expired air, accompanying, as it generally does, intense inflammation of the lung, or of some remote viscus, may, in addition to other signs, indicate the expediency of antiphlogistic remedies. When, on he contrary, the expired air is cold, it denotes a sinking of the powers of life, and indicates the necessity of stimulating and tonic means.

As *fœtor* of the breath may depend on several organic causes, these causes must be carefully investigated, in order that a rational plan of treatment may be adopted. Thus, we must know whether it depends on abscess in the mouth or fauces, on the use of mercury, on scurvy, or on disease of lung. It is clear that in all these cases the same treatment will not answer.

The signs afforded by the stethoscope, though valuable for diagnosis, are by no means equally so in directing our therapeutic indications. Thus, the puerile respiration, or the absence of respiration in some particular part, can only be of value when we have been able to determine the nature of the lesion which produces them. We must accordingly have recourse to other signs, and the investigation of the different rhonchi may yield us some useful information. Thus the moist or crepitating rhonchi, joined to the absence of respiration and other signs, by indicating the existence of pneumonia in the first stage, will point out the expediency of the antiphlogistic treatment.

Percussion of the chest, though so useful in diagnosis, is but of secondary utility in treatment.

Cough, depending as it does on such a variety of causes, can afford therapeutic indications only when the disease, or physical agent which excites it, has been ascertained.

The matter of expectoration may, conjointly with other phenomena, assist in pointing out the mode of treatment to be adopted. Thus, its colour, odour, taste, consistence, and temperature, can be of use only so far as they characterize the species of disease which they accompany. It is not sufficient that the sputa should be bloody in order to determine the necessary kind of treatment: it is further necessary to know whether the hæmoptysis be idiopathic, primary, symptomatic, critical, supplementary, sthenic, or asthenic.

With respect to the *animal heat*, it may be said, that its increase is a sign of irritation in the system, to which it is in general proportioned. It therefore requires an antiphlogistic mode of treatment: we must have regard, however, to the time of day, to the period of the disease, and to many other modifying circumstances. The heat, for instance, which patients feel during the paroxysm, cannot have the same therapeutic value as that observed at any other period. If there be a diminution of heat, the use of debilitants must be restricted. If this diminution goes so far as to produce continued cold, it denotes a collapse of the vital powers, and indicates the necessity of tonics and stimulants.

Dryness of the skin, concurrently with its heat and redness, and other phenomena of irritation, may incline us to the adoption of the antiphlogistic treatment; but it is necessary to observe whether the disease is in its first stage, and whether this morbid phenomenon really accompanies a state of superexcitement; for if it were owing to the excess of any other supplementary evacuation, the same treatment would not, of course, be applicable.

Sanguineous exhalations do not always present the same indications. It should be always held in recollection, that such hemorrhage is but a symptom, and the business of the physician is to ascertain what is its organic cause. He should in-form himself whether such hæmorrhage is idiopathic, primary, or consecutive—supplementary, critical, symptomatic, &c. If it be critical, he should not interfere with it; if it be supplementary, he should do everything in his power to re-establish the suppressed evacuation; if he find that the hæmorrhage is idiopathic and primary, he must ascertain whether it be active or passive; in the former case he will employ debilitating means, and in the latter tonics. If the hæmorrhage be so very profuse as to endanger the patient's life, he must employ all the resources of his art to arrest it, cold and astringent lotions, ice, revulsives, &c.

The therapeutic indications derived from inspecting the urine are but few, and not very important.

The perceptible diminution in the quantity of the urine in acute diseases, is one of the signs which indicate the necessity of antiphlogistic treatment.

The yellow and saffron-coloured urine, which generally denotes disease of liver, is useful only as a diagnostic sign.

High temperature of the urine, in acute diseases, points out the necessity of antiphlogistic measures.

Hæmaturia is but a symptom, and, like all other symptoms, is no farther useful in a therapeutic sense than as it serves to make known what the existing disease is. Should it be the result of simple exhalation, we must ascertain whether it be primary, secondary, or supplementary—if it be symptomatic, we must examine whether it depends on disease of the urethra. bladder, ureters, or kidneys: when hæmaturia is symptomatic of a calculus in the bladder, the cause must be removed by surgical operation.

2dly. *Therapeutic indications derived from the morbid phenomena of the organs of animal life.*

It is only by making known to us the actual nature of the disease, thatthe signs afforded by the exterior habit of the body can afford any assistance in a therapeutic point of view.

A firm and confident attitude of the body being ordinarily he sign of a certain degree of excitement, may, when con-oined with other symptoms characterising this state of the ystem, indicate a depleting plan of treatment. On the con-rary, when the attitude denotes languor and exhaustion, and hen the physical seem to preponderate over the organic laws, n opposite plan of treatment is indicated.

A restless and inconstant attitude of body, depending as it oes on a variety of causes, can only be useful by aiding in the iagnosis ; if it depend on external irritation, or cutaneous in-ammation, emollient and topical applications are, in general, ndicated. If, however, it depend on internal disease, such as erebral hæmorrhage, or cerebral congestion, a very active epletory mode of treatment is called for.

Œdema and anasarca being but consecutive or secondary henomena, it is against their internal cause that our treatment ould be chiefly directed. Still, as the primary disease is often eyond the resources of art, we are obliged, in order to obviate relieve the distress occasioned by such phenomena, to pre-ribe for mere symptoms, and so to order diuretics, hydragogue thartics, diaphoretics, and the like.

Where the skin presents a pale or livid hue, we are, generally eaking, warranted in inferring an anemic or asthenic state, d accordingly in prescribing a tonic and stimulating treat-ent. We must, however, beware of doing so in the cold stage acute or intermittent disease.

A red tint of the skin may be considered as one of the least uivocal signs of a hyper-sthenic state of the system, and erefore as requiring depleting measures. It may be neces-ry, however, to inquire whether this phenomenon may not be ing to some eruption, or to the action of some external itant.

The absurdity of anti-icteric formulæ, so much lauded by the vulgar in the cure of jaundice, will at once appear, when we reflect on what a variety of causes this symptom may depend. Pathology now shows that it may be occasioned by inflammation of the liver or of its ducts, of the duodenum ; by some tumour of this viscus, such as cancer or tubercle ; by the presence of biliary calculi ; by tumours of adjacent organs—such as tumours of the stomach, pancreas, duodenum, or kidney—pressing on the bile ducts.

The expression of the face, and its general appearance, may often concur with other phenomena in pointing out the necessary treatment. Thus a flushed, animated countenance may incline one to the adoption of depleting measures, whilst a dejected look and immobility of the features point out the necessity of an opposite treatment.

The changes produced by disease on the appearance of the eyes have rarely any other therapeutic value, save that resulting from their diagnostic importance. Thus an injected state of the cornea, generally accompanying either ophthalmia or intense inflammation of some internal organ, is one of those signs which indicate the necessity of depleting measures.

When dilated pupil exists, its organic cause must be ascertained before we have recourse to any treatment. A contracted state of the pupil, depending ordinarily on irritation, as on iritis, meningitis, or internal ophthalmia, is to be combated by antiphlogistic measures. An irregularity in the pupillary aperture being generally dependent on the presence of worms in the alimentary canal, our treatment should of course be directed against the cause of the disease.

When the abdomen is distended by gases or liquids, our object is, first, to combat the diseases which give rise to them ; but when all our efforts to accomplish this have failed, we are then obliged to have recourse to symptomatic treatment.

With respect to the muscular system, as a source whence we may obtain therapeutic indications, it may be observed that increased muscular action does not always call for antiphlogistic treatment. In epileptic or hysterical convulsions, for instance, of long standing, we rarely have recourse to such treatment. In acute delirium, the exaltation of muscular power may sometimes call for depleting measures.

Depression of muscular power, at the commencement of acute diseases, is far from being, as is commonly thought, the sign of real debility, and therefore from uniformly indicating the necessity of tonics. One of the most striking instances of the imperative necessity of studying the organic lesion on which the symptoms depend is paralysis. This was formerly believed to consist in diminution or abolition of the vital powers, and, in accordance with this view, stimulating liniments were used indiscriminately on the affected limbs; in the same way nux vomica, stimulants and tonics, electricity and galvanism, were administered, with the hope of resuscitating the vital properties so diminished or abolished. Paralysis, however, which is but a symptom, will have a different herapeutic value, according to the diagnostic signification which it may bear. If it be the sign of an affection of the brain or its dependencies, or the sign of a change in the organs which perform the various motions, it will present different ndications, which indications will vary according to the pecies of organic change existing. With respect to the brain, e should ascertain whether the paralysis be produced by conestion, inflammation, hæmorrhage, &c., as our treatment must vary accordingly. If the cause of the paralysis is seated the paralysed limb, and if this paralysis depend on disease a nerve, on compression of this nerve by a tumour, on obliteation of the vessels, on violent muscular contraction; if it be mpathetic of poisoning, of lead-colic, &c., it is against the principal disease we should direct our treatment, the degree of the paralysis serving to graduate the means to be employed.

Much vagueness and uncertainty may be observed in the treatment of certain nervous affections, such as chorea, catalepsy, hysteria, epilepsy, hypochondriasis, &c.; which uncertainty is, no doubt, the result of the obscurity in the diagnosis, as it is more than probable that, did we but know the organic lesion which produces the functional disturbances designated by these names, the treatment would be much more rational and more successful.

The changes occasionally observed in the voice and in speech can point out the particular mode of treatment only so far as they serve to characterize and point out the cause which produces them.

Thus, the violent cries of some maniacs, and of patients in a state of acute delirium, are indicative merely of mental alienation, or of inflammation of the brain and its membranes. Yet, as the tone of such cries, generally speaking, denotes tolerably well the state of the patient's strength, some aid may be derived from them in judging whether depleting measures are necessary.

Weakness of the voice, in acute diseases not seated in the respiratory organs, generally characterizes a state of real exhaustion. This proposition, however, is far from being universally true. Severe visceral inflammation, either by excess of pain, or by the local concentration of the powers of the system in the affected organ, may produce weakness of the voice, without our being warranted in thence concluding that the patient is really weak, that debilitating measures are improper, or that tonic treatment is indicated; such conclusions might, in several cases, be productive of the most mischievous results. In acute inflammation of the air-passages, weakness of the voice is still less an unerring sign of real debility, or of the neessity of stimulation ; the antiphlogistic treatment, on the ontrary, by removing the irritation and pain, soon restores he voice to its natural tone. In diseases, however, of long tanding, after considerable evacuations, prolonged abstinence, c., weakness of the voice is, in general, indicative of, and proortioned to, the debility of the patient, and accordingly the onic plan of treatment is imperatively required.

When the change in the voice gives reason to suspect the resence of polypus, angina, croup, &c., the indications of reatment depend, of course, on the diagnosis. A tremulous oice may denote a profound state of collapse, and indicate the ecessity of tonic, revulsive, and other such measures ; or lse it may precede and accompany delirium, and then, accordng to the nature of the case, a different or opposite plan of reatment may be required.

To the changes which the speech may undergo in disease, the ame remarks are applicable as in the case of the voice ; they re nearly all of them symptomatic of different diseases of the rain, and afford but little aid in furnishing the proper theraeutic indication.

With respect to the general sensibility, it is to be remarked hat those persons whose general sensibility is very much exlted are much more sensible to external stimuli, and to the ction of therapeutical agents, than others, and therefore the ctivity of our remedial measures must be proportioned to this tate of the individual. This precaution is indispensably necesary in the case of hysterical and nervous patients, in the reatment of whose affections we should always commence by entle remedies, and increase the dose and activity of them radually and cautiously.

In affections of the brain accompanied by compression, wheer sanguineous or serous, diminution of sensibility affords no articular indication of itself. It is only by treating the principal disease that we can expect to restore the system to its normal state.

The question presents itself, whether the pain which accompanies the great majority of diseases, and which presents in each a peculiar character, can be combated by particular means? Those practitioners whose leading theory it was that each individual symptom required to be met by a special remedy, and who, in accordance with this theory, employed opium to relieve inflammatory pain, would answer this question in the affirmative. And though such a therapeutical principle is anything but sound, still every medical man knows that there are cases where he is obliged to regulate his conduct in conformity with it. Thus, in the case of violent pain, a special remedial agent may be directed to combat it: 1st, in the case where it constitutes the principal phenomenon of the disease, as in nervous pains; 2nd, when in chronic diseases the pain becomes very violent, and narcotics, employed internally and externally, cannot increase the principal disease. In other cases, however, it is the disease, of which the pain is but the companion, that we must combat.

The nature also of the pain may render it necessary to modify the treatment. If the quality of the pain denotes the existence of suppuration, blood-letting must be suspended; which must again be resorted to, if the pain indicate sanguineous congestion, or acute inflammation. In a word, our curative agents must vary with the nature of the disease characterized by the pain. It is unnecessary to say that the pain of inflammation, nervous pain, the pain of rheumatism or of gout, that which depends on intestinal gases, on accumulated fæces, worms, &c., should not be treated after the same manner; another proof, if such were wanting, that all rational and judicious medical treatment must depend on the accuracy of our diagnosis.

With respect to the organs of the special senses, and the therapeutic signs derivable from them and from their functions, t may be observed, that the exaltation of the senses occur-ing in acute diseases, and more especially in that of the rain and its membranes, requires that the organ be protected rom all external stimulus. The same precaution is necessary, when the exaltation of the sense arises from inflammation of he organ itself.

With respect to the changes produced by disease in the noral feelings and intellectual faculties, and the therapeutic ndications to be deduced therefrom, it is impossible to lay own general rules; close observation, clinical study, and the agacity of the physician, can alone serve to suggest to him he most appropriate plan of treatment in such cases.

F THE THERAPEUTIC INDICATIONS DERIVED FROM THE MORBID PHENOMENA OF THE GENITAL ORGANS AND FUNCTIONS.

The genital organs in the male subject afford no general ierapeutic indications; their diseases come for the most part nder the care of the surgeon, and require special treatment. he same, however, cannot be said of the functions of these gans in the female; they present to us therapeutic indica-ons of the highest importance, and claim all the attention f the physician; the least negligence in this respect may ring on the most serious consequences, and even compro-ise life. Regularity in the function of menstruation is an dispensable condition in the health of women, and any de-ngement in this function requires the most prompt relief.

When women are exposed to the influence of a morbific use at the time of menstruating, they feel the effects of it uch more readily than at any other period. They then adily become affected with disease; and one of the first sults of this morbific influence is the suppression of men-ruation. This suppression has been considered by several physicians as consecutive on diseases; they will have it, that the morbific cause acted first on the diseased organ; that the irritation once produced, it occasioned an actual revulsion; whence they have concluded that the menstrual suppression being but an effect, it merits not all the importance attached to it, and that it is against the organ immediately affected our treatment should be directed. Every practical physician, however, who has experience in the treatment of the diseases of females, feels satisfied that if he neglected the indication of restoring the suppressed menstruation, he should deprive himself of valuable therapeutic resources. But even admitting the necessity of first directing our attention to the organ primarily affected, it is still imperative on us to do all in our power to restore the menstrual flux; for if we neglect to do so, and confine our attention exclusively to the primary disease, the menstrual derangement may continue, and become habitual; and thus the disease may pass into the chronic state. There are cases, however, where we incur the risk of seeing the patient perish, unless we abandon this indication, and that is when the symptoms of the primary disease are so intense, violent, and rapid, as to threaten the patient's life. Thus, when pneumonia or hæmoptysis becomes so violent as to cause alarm for the patient's existence, we must attack the primary disease by copious blood-letting, and other active measures, without having any reference to the state of the menstrual discharge.

In acute diseases we frequently see the local and constitutional phenomena disappear, when menstruation has been restored. It has, we know, been said that the menses returned, because the disease abated; yet, after all the most active means have been employed to restore the discharge, it is not unreasonable to suppose, that our succeeding in doing so has not been without its salutary effects.

As a general rule, it may be laid down, that whenever the menstrual discharge becomes deranged, either by being excessive or defective, the physician should use all his efforts to restore it to its normal state.

In conformity with this rule, whenever a young girl who has not yet menstruated, or in whom this function has been performed with difficulty or pain, complains of symptoms of plethora or congestion, and when these symptoms appear attributable to dysmenorrhea, our object should be to establish the menstrual flux; in women who have attained the critical period, the same causes and the same effects demand similar treatment.

If we would now collect within a narrow compass the chief morbid phenomena which possess equal or similar therapeutic importance, we may set down among those which, *in general*, indicate the antiphlogistic treatment, the following signs:—

Intense thirst; redness, dryness, and roughness of the tongue, its increase or diminution in size, aphthous or other eruptions appearing on it; its being covered with an adherent, viscid coating; redness and swelling of the fauces; difficulty in deglutition; nausea, and occasional vomiting of bilious matter, and sometimes even of blood; pain in the epigastrium, increased by pressure; constipation or diarrhœa; hard, tense state of the abdomen:

Strength, frequency, fulness or hardness of the pulse; strong pulsation of the carotid and temporal arteries, or of the abdominal aorta; swelling and tension of the superficial veins; great consistence and bright red colour of the blood; strong and frequent pulsation of the heart, with violent impulsion:

Respiration frequent and difficult; heat of the expired air; crepitous rhonchus; absence of respiratory murmur over some part of the thorax, with dulness of sound on percussion; frequent, painful, and dry cough; difficulty and pain in expectorating; sputa bloody, rust-coloured, viscid, and tenacious; pain in some part of the chest, &c.:

Intense heat over the body, with dryness of the skin; diminution in the exhalations from the mucous membranes, and great dryness and heat of these parts; supplementary exhalations of blood, idiopathic or symptomatic suppression or diminution of an habitual hæmorrhage; redness or dryness of surfaces which suppurate:

Profusion, or even suppression, of the lacrymal secretion; increased secretion, or, on the contrary, diminution of the saliva; great increase in the biliary secretion; scantiness, redness, and heat of urine; hæmaturia, micturition difficult and painful:

Embonpoint considerable; general or partial hypertrophy; firmness of the flesh; great size of the cavities, and developement of the features:

Great redness and heat of skin; high complexion and fulness of the face; eyes bright, fixed, red, and injected:

Great strength of voice; exaltation of the general sensibility, sometimes its diminution or total abolition; exaltation and sometimes perversion of the special senses; want of sleep, or sleep much disturbed by dreams; on some occasions stupor and somnolence.

Lastly, suppression or diminution of the menstrual discharge.

Such is the series of signs which more particularly require the employment of antiphlogistic measures; it must not, however, be forgotten that these assertions are not absolute, they are only relative; that in many cases many of these morbid phenomena do not require the antiphlogistic treatment; whilst, in other cases, phenomena apparently of an opposite character may require it. Again, it must be borne in mind that the antiphlogistic treatment is by no means the same for all cases, its activity varying considerably according to the nature of the case; that mere abstinence and diluent drinks will suffice in some cases, whilst in others it is necessary to have recourse to frequent and copious blood-letting.

We may now consider those morbid phenomena which, in *general*, demand or warrant a tonic and stimulating plan of treatment. They are almost all directly opposed to the preceding; they are:—

Absence of thirst; paleness, or dark-brown colour of the tongue, unaccompanied by dryness; a mucous or thready coating of this organ; slow digestion; flatulent state of the abdomen:

Weak, small, and soft pulse; sluggishness of the capillary circulation; depression of the superficial veins; poverty of the blood; large quantity of serum in it; obscure and weak pulsations of the heart:

Difficulty of breathing, arising from weakness of the organs of respiration; coldness of the expired air, which in some cases exhales a fœtid odour; coldness of the whole body, or merely of the extremities:

Increased serous exhalation; infiltration of the cavities and of the extremities; urine pale and cold, and difficulty in voiding it; marasmus:

Prostration and languor evinced in the attitude; difficulty in moving, and unwillingness to exertion; softness and flaccidity of the flesh; features small and contracted; cavities small; paleness and lividity of the skin, on which also spontaneous ecchymoses are frequently observable; dulness of the eyes, heaviness of the eyelids, which are frequently half closed:

Weakness of the voice; general insensibility, stupor, drowsiness; the signs characterizing the chlorotic state, &c.

Such are the signs which usually incline the medical practitioner to employ tonics and stimulants in treating the diseases of females; yet as some of these signs may depend on concentration of strength, we should expose ourselves to the risk of committing serious errors, if we did not use all our care in forming a correct judgment in individual cases. It must also be borne in mind, that these various morbid phenomena are far from presenting themselves combined in the same individual; the more of them, however, we find united in a given instance, the more value will they have, and the more influence should they exert in directing and deciding the treatment.

OF THE CAUSES OF DISEASES, CONSIDERED AS THERAPEUTICAL INDICATIONS.

The causes of diseases are probably the most obscure part of their history. But little is known of their mode of action, and there are but few of them really indispensable to the production of diseases; most of them may give rise indifferently to all affections. When an individual placed under the influence of a morbific agent is struck with disease, the first question which suggests itself is, whether the disease would not have been developed without this agent? and again, whether this same cause would have produced this same disease in another individual? This uncertainty in the effects of morbific agents has caused medical men to pay but little attention to this branch of pathology; there can be no doubt but that, in order that a morbific cause should produce its full effect, there must exist a particular disposition in the individual, with the nature of which we are entirely unacquainted, but which, however, constitutes the principal difficulty in the matter. If this disposition exist not in the individual, the disease will not be produced; but, from our total ignorance of its nature, it can obviously throw no light on the therapeutical means to be employed in a given case. Let us suppose fifty individuals exposed to the influence of one and the same morbific cause, as, for instance, to the influence of cold; we shall find them all attacked by different diseases. Some will have pneumonia, others bronchitis, some pleuritis, some erysipelas, and others rheumatism ; which circumstance can only be accounted for by supposing that there exists in each a peculiar disposition previous to the application of the exciting cause ; this disposition does not constitute a morbid state, as previously to the exposure they were all in perfect health, and probably without such exposure they would have remained so ; as also without this disposition they would have continued in perfect health, notwithstanding the exposure to cold. Thus these two circumstances are necessary the one to the other for the production of he disease ; still the predisposition is without doubt far the more important of the two. Here, then, we have to consider, in etiology, two orders of things, namely, the occasional causes, and the predisposition.

Notwithstanding the great vagueness and obscurity which till reign over the nature of morbific causes, we must not onclude that the investigation of them is of no advantage o the therapeutist ; there are, on the contrary, many cases herein such an investigation will prove of the utmost utility n directing the treatment.

Experience shows that the axiom, *sublatâ causâ tollitur ffectus*, so applicable in physics, is by no means equally o in physic ; for we see that though the cause has ceased to xist, the disease still proceeds in its course ; and though, in many nstances, it is needless and even impossible to direct any thera-eutical means against such a cause, still there may be cases herein the nature of the cause has been such as to induce the ecessity of modifying considerably the ordinary mode of eatment. It is probably more in reference to the causes, han to the morbid phenomena, that the maxim, *contraria ntrariis curantur*, principally holds good.

Among the morbific agents which produce a disease where here exists a predisposition, there are many against which art can effect nothing: as, for instance, the impression of hot or cold air, the rapid transition from the one to the other, damp clothes, excess or irregularity in diet, immoderate exercise of an organ, excess in singing, want of sleep, &c. Yet even in such cases this indication may be deduced, namely, to allow the organ which has been too much exercised to enjoy repose, to enjoin strict regimen after errors or deviations in diet, and sleep and repose after watching and fatigue, &c. The suppression of an habitual discharge, as a hæmorrhage, the menstrual flux, an issue, or old sore, the retrocession of an eruption, of gout, &c., afford important indications, which, if used judiciously, may prove most important and valuable to the therapeutist, who, whenever the suppression of an habitual discharge is the occasional cause of a disease, should do all in his power to re-establish it.

There are certain causes which give rise to disease in a more *special* manner; these *special causes* afford more precise indications than those we have been considering. These causes produce disease in a more particular and especial manner, but still this same disease is capable of being produced by other causes. Thus asphyxia may be produced by strangulation, submersion, the respiring of certain gases, &c. Among these special causes, poisons hold the first place; and here we have still further proof of the advantage to be derived from the knowledge of causes. We know that the treatment requisite in most cases of poisoning varies according to the poisonous substance taken; for the general treatment is by no means the same, whether the poison be an irritant, a narcotic, or a narcotico-acrid. Again, if a patient complains of severe colic, and we find that his occupation obliges him continually to handle lead, we are at once led from a knowledge of the cause to select the appropriate treatment.

What has been said of the *special* will also apply to the *specific* causes of disease, that is, those causes which produce disease by contagion.

If we now consider the predisposing causes, we shall find several circumstances connected with them which require a special and particular line of treatment. Thus a too rich or nutritious diet, by producing a too abundant hæmatosis, disposes to inflammatory affections. The first indication deducible from this circumstance is, to diminish the quantity of the nutritive material, and also to reduce the quantity of the circulating fluid already existing. On the contrary, a poor low diet will require of us to be cautious and sparing in the use of blood-letting or other depleting measures.

The abuse of wine and fermented liquors predisposes to serious and often fatal diseases. The indication to be obtained from this circumstance is, of course, to discontinue the mischievous habit. The same may be said of the abuse of tea, coffee, and other such drinks.

Residence in an unhealthful situation, clothing too heavy, or the contrary, tight lacing, the habitual use of warm or cold athing, excessive evacuations, excessive or deficient muscular xercise, too much or too little sleep, and a variety of other auses, predispose to certain diseases; the obvious indication is o discontinue or remove such predisposing causes.

What has now been said is sufficient to show how important t is that the physician should investigate the causes of isease. This investigation requires considerable attention, nd no less sagacity on his part. Experience fully proves ow difficult it is in general to obtain the truth from patients, with respect to the causes of their ailments, as also with respect to the manner in which the first symptoms became eveloped. In many cases, though the nature and seat of he disease be thoroughly known, still it is important to trace back the causes which may have occasioned it, as such cause may still continue to act, and so every moment aggravate the disease already existing. It is towards this cause the efforts of our therapeutical means should be first directed, as it often happens that after its removal all the phenomena excited by it disappear forthwith. Thus, when the intestinal canal contains noxious and offensive matters, which excite and keep up irritation in the tube, such matters must be eliminated before we can expect the irritation to cease. In fact, whenever the cause of the disease still exists, the object of the practitioner should be to destroy it before attacking its effects. In some cases, however, it may be necessary to mitigate the too great violence of the symptoms, before any attempt is made to destroy their cause. Thus, in some cases of gastro-intestinal irritation occasioned by the presence of offensive matters, or of worms, it is somtimes necessary to abate the irritation of the intestinal canal, before we have recourse to purgatives or anthelmintics. The same principle holds good in surgery, as for instance in the case of compound fractures, where the violence of the inflammation must be first subdued before any attempt is made at reduction.

OF THE NATURE OF DISEASES, CONSIDERED AS A THERAPEUTIC INDICATION.

The nature of diseases being obviously different, it is equally obvious that the treatment appropriate to each must also be different. Among the affections of a particular nature may be placed the special and specific irritations, which include most of the diseases of the skin, both acute and chronic. and several affections, both of mucous and synovial membranes. Most of these diseases are cured by simple antiphlogistic treatment. Among the chronic inflammations of the skin, there are several of a specific nature, as scabies, tinea, c., which are evidently transmitted by contagion, and re- uire a particular mode of treatment.

The treatment of some specific diseases is as yet but little dvanced, and we are accordingly obliged to be directed, in ference to them, by the principles and rules of general thology. The same may be said of many of the neuroses, ith the organic cause of which we are entirely unacquainted.

The different varieties of hæmorrhage generally require ry simple treatment; yet as they differ essentially one from e other, this treatment cannot be the same for all. Thus tive or hypersthenic hæmorrhage will be best treated by pleting measures, to be graduated according to the nature of e case; whilst asthenic and scorbutic hæmorrhage will call r an opposite mode of treatment; neutral or interme- ate hæmorrhage will be best met by simple revulsions; pplementary hæmorrhage will require a particular mode of atment; symptomatic hæmorrhage, again, will require our ention to be directed towards the primary disease. Should hæmorrhage be critical, we should be cautious in interfer- with it.

What has been said of hæmorrhages, will also apply to the ious phlegmasiæ, which, when acute or simple, all require antiphlogistic treatment. These simple inflammations, wever, require some modifications of treatment, according as y are primary or consecutive. In the latter case, the prin- al disease must be combated. The treatment will also be dified according as the disease is accompanied with a sthenic asthenic state of the system.

F THE SEAT OF DISEASE, CONSIDERED AS A THERAPEUTIC INDICATION.

When the physician is called to a patient, his first duty o discover what organ is the seat of disease. All his researches into the history of the case, all his investigations with respect to the disturbance of the functions, are solely to enable him to ascend to the knowledge of the parts primarily affected. We cannot have a just and complete idea of a disease, until, after having ascertained its nature and the mode of action of the causes which have excited it, we are able to trace the impression of these causes on one or more organs, and to determine the connexion of the lesions and of the phenomena which have been successively developed. It is only then the physician can deduce the curative indications arising from such a state, and the most effectual treatment to be employed; for it is then only he is able to trace back in thought the various modifications which the organs must undergo in order to be restored to their healthy state.

Without accurately knowing the parts affected, how should we apply the appropriate treatment to paralysis and convulsive affections, which are the effect of the primary or secondary irritations seated in the brain and its membranes? The fundamental basis of therapeutics, as well as of pathology, obviously consists in the knowledge of the seat and nature of diseases.

It is scarcely necessary to state that pathological anatomy should always be resorted to by the physician in his investigation of disease. The knowledge of symptoms should be so closely connected with that of the lesions of organs, that every time he observes the one, the others should present themselves to the mind; for symptoms are of no value whatever, unless when they indicate the pain of an organ and the nature of its lesion. It has been objected to this close alliance between pathology and the study of the organs after death, that the latter only show us the effects of disease. This objection would doubtless be of some value, if death never took place till diseases had run through all their stages. But we know that such is not the case. Inflammation, for instance, may carry off a patient, sometimes in a few hours, sometimes in a few days, and sometimes not till after a certain number of years.

When the disease is acute and recent, the first general indication to be drawn from a knowledge of its seat, is to apply our therapeutical means as near as possible to the place affected; the second is, that the activity of the means employed should be duly proportioned to the dignity and vital importance of the organ affected. Thus, when the brain is affected, it is to the parts which act most promptly and most potently on this organ, that our curative means should be chiefly applied. This is the reason why, in inflammation or congestion of this organ, bleeding from the jugular vein is preferred; whilst, in inflammation of the pulmonary parenchyma, bleeding from the arm is usually adopted, there being no other vein which corresponds more immediately with the lungs.

This is the reason why in all visceral inflammations it is more rational, more anatomical, and consequently more effectual, to take blood from the general system than by leeches.

When the disease requires the employment of revulsives, its seat points out the proper place to apply them.

In diseases of the head some apply them to the legs, others to the nucha, or even to the cranium. In cases of congestion or inflammation of the brain or its appendages, ice is often applied with advantage to the head, and sinapisms, or blisters, but rarely to this part; whilst, on the contrary, in thoracic affections, blisters are frequently placed on the chest, and ice never.

OF THE COURSE, DURATION, AND PERIODS OF DISEASES, CONSIDERED AS THERAPEUTIC INDICATIONS.

The course of a disease may be acute or chronic, continued, remittent, or intermittent; no doubt the treatment must be more or less influenced by these different forms. In acute diseases, active treatment is generally indicated. When a disease threatens the patient's lfe, we cannot be too prompt or decided in the application of remedies. Thus let us suppose an individual attacked with cerebral hæmorrhage; a large bleeding performed at the instant may suspend a fatal effusion, and so rescue the patient from destruction. The violence of the symptoms, and the rapidity with which the disease progresses, must then necessarily influence the selection of the remedies, as also their activity. Copious and repeated blood-letting, both local and general, rigid abstinence, the whole artillery of the most powerful revulsives, must then be put into requisition. But if the progress of the disease be slow, less active and energetic remedies will be required.

Though the danger be less pressing than those above described, still if the symptoms present a certain degree of severity, inert or expectant practice must be altogether abandoned, as its effects will undoubtedly be to favour the disorganization of the viscera, and the establishment of some chronic disease which may be beyond all the resources of art.

Every practical physician must be aware of the great influence which the periods or stages of disease should exercise on the choice and activity of the remedies to be employed. Thus we often witness the extraordinary good effects of blood-letting at the very commencement of inflammation; a remedial agent, which, though often necessary in the advanced stage of the disease, is never observed to produce such striking and almost marvellously good results as at its onset. Again, when the inflammation has ended in suppuration, even though the fever may still continue very high, blood-letting is but rarely attended with advantage. Hippocrates, convinced of the importance and great advantages of blood-letting at the very onset of a disease, carried the principle, perhaps, somewhat too far, when he laid down the rule that blood-letting should not be resorted to after the seventh day. But though we are deprived of the aid of blood-letting in the advanced stage, and more especially towards the decline of inflammatory diseases, we shall find a powerful and valuable auxiliary in the employment of revulsives, which may be applied to the skin or the intestines, according to the nature of the case, as also in the use of tonics and stimulants.

There are but few diseases at the commencement of which revulsives are either indicated or applicable; among these few may be reckoned cerebral congestion or hæmorrhage. On such occasions, after abstracting a certain quantity of blood, we find it useful to pass on to the employment of cutaneous revulsives, as also to the application of revulsives to the large intestines, in the form of purgatives; but in general it is only towards the termination of diseases, when visceral engorgement still continues, when the patient's strength is considerably diminished, and there is reason to dread lest the function of absorption is not sufficiently active to effect a resolution. It is at the same period also that tonics are found useful. Hence, then, it is evident that the periods or stages of diseases must influence us in the choice of remedies. Even the time of the day is not devoid of influence in the employment of remedies; thus, if narcotics are necessary, the evening or night is usually the time selected for their administration.

When diseases become chronic, we can no longer persevere in the same line of treatment; our therapeutical agent can no longer be so energetic. If blood-letting be now indicated, it must not be so copious; local, small bleedings, repeated according to the exigence of the case, must take the place of the copious, general bleeding employed in the acute form; it is now revulsives may be employed with more advantage, and without the risk of exciting re-action; nor is so much strictness or rigour to be observed in the matter of diet; the practitioner, however, should be careful to select such articles of food and drink as may be most suitable to the nature of the disease; the quantity, nature, and mode of their preparation, also should be carefully regulated; as also the air, climate, habitation, and even the kind of clothing to be worn by the patient; the various secretions also call for attention on the part of the physician; the quantity and quality of exercise to be taken; the number of hours' sleep; the manner in which the patient should occupy his mind; even his moral feelings should, if possible, be attended to. It is only by a judicious selection, a methodical and well-regulated employment of all these means, that we shall be enabled to arrest the progress of these obstinate affections, and sometimes even to cure them.

In conclusion, it may be laid down as a general rule of most undoubted importance in practice, that a disease produced by irritation, whatever stage it may have reached, changes not its nature, and invariably requires that sort of treatment which is calculated to destroy the excess of stimulation in the parts or organs affected.

Nothing more absurd or mischievous than to run to tonics the moment the super-excitement of the vital movements has commenced to abate. By so acting we seem to fear that the fever and other symptoms of excitement may cease too soon.

CHAPTER IV.

CIRCUMSTANCES MODIFYING THE INDICATIONS OF CURE.

Modifications induced by age—By sex—By profession and habits—By temperament and idiosyncrasy—By appetites.

The general principles which should direct the medical practitioner in attaining the therapeutical indications being now stated, we shall next advert to the principal circumstances, which are found so frequently to modify those indications in the treatment of disease.* It requires not much observation to enable us to see that there is such variety in the human species, that no two individuals can be found to be perfectly alike in all circumstances. Bodily strength, stature, constitution, age, sex, idiosyncrasy, habits, all are different in different individuals. And these circumstances, so varied and so numerous, induce the necessity of considerable modifications in the treatment of disease. No one, of course, would think of treating disease in the infant in the cradle, or in the decrepit old man, after the same manner as in the vigorous adult.

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* On the importance of attending to the various circumstances which may modify the treatment of disease, we cannot do better than cite the very forcible and equally just remark of Hufeland, from his *Lehrbuch der Allgem. Heilk*, sec. 38, viz. "The physician should generalise the disease, and individualise his patient, as much as possible."

MODIFICATIONS INDUCED BY DIFFERENCE OF AGE.

In treating the diseases of infants and young persons, considerable caution is necessary; in such subjects the sympathies are much more active than in adults. In consequence of the predominance of their nervous system, the irritations with which they are affected readily become complicated with serious over-excitement of the brain and its membranes. The stomach and intestinal tube being at this period of life endowed with great vital activity, and being the organs more especially exposed to the most powerful causes of disease, their irritation is extremely frequent, and complicates almost all the other phlegmasiæ; for which reason the digestive organs of children should engage the attention of the physician more even than in the case of adults or aged persons. At the commencement of life the several irritations are much more rapid in their course and more quickly fatal, than at a more advanced period. These considerations should always be present to the mind of the practitioner in the treatment of infantile disease. When blood-letting is indicated, it should be proportioned to the weakness of the little patient. In children, revulsives act with more energy and efficacy than in the case of adults, from the greater excitability of the nervous system, and the comparatively greater facility with which irritations are displaced. From the delicacy and susceptibility of the various organs, the diseases of infants must be treated, not only with medicines administered in smaller doses, but such medicines must be given in a much more simple form than in the case of adults. Tonics and good diet, when indicated, are observed to produce extraordinary good effects in a very few days. In other cases blood-letting duly proportioned, revulsives more or less energetic, abstinence more or less strict, and mild sedatives, are the means almost always sufficient to restore health; whilst violent emetics, drastic purgatives, and other very active medicines, such as nitrate of silver, acetate of lead, must be altogether proscribed.

With respect to the chronic diseases of young persons, we may remark, that the body not having yet attained its full growth, the physician may often, merely by the prudent adoption of hygienic means, diminish the violence of the vital actions in the parts affected, and give to all the functions a salutary direction, and so destroy the predominance of certain organs, and re-establish an equilibrium in the machine. The hygienic mode of treatment is the most effectual in cases of scrofula, rickets, and in those cases where there is a disposition to pulmonary phthisis.

At the decline of life, when the vital movements become diminished in their intensity, and the various organs perform their functions but imperfectly, far other considerations present themselves to the mind of the practitioner. The serious changes which the progress of age impresses on the constitution give rise to diseases so widely different, that we have no hesitation in saying, that the therapeutics of aged persons form an almost entirely distinct branch of medical practice from that of the other periods of life. The accurate observer will keep in recollection, that many of the diseases of old age depend on debility, occasioned by the wear and tear of a frame now a long time in use; hence, the strength becomes impaired, the function of nutrition goes on languidly, the movements of the several organs are slow and difficult, and accompanied with a feeling of diminished energy, at the same time that the pulse is tranquil and even weak, the temperature of the skin lowered, and there is observed no sign of local excitement. It is then that nutritious food, and such a is easy of digestion, together with generous wine, may be found serviceable. It cannot, however, be denied, that many of the diseases of old age depend on irritations slowly developed in the tissues of the body by the long-continued action of the several organs; thus, we see in old men the genito-urinary apparatus, now actively employed for such a length of years, become the seat of greater or less disturbance; catarrhus vesicæ, scirrhous enlargements of the prostate and testicle, renal or vesical calculi. If we turn our eyes to the digestive apparatus, we shall there see numerous instances of chronic gastritis, ascites, scirrhous engorgement of all the viscera, and obstructions of the portal system. Again, if we turn to the respiratory system, we shall find chronic catarrhs, pneumonia, pleuritis, &c. The heart again becomes the seat of dilatation, giving rise to asthma, dyspnœa, and angina pectoris, diseases which are the almost exclusive appendages of old age. Those degenerescences of organs, those transformations of serous or mucous tissues into fibrous or cartilaginous structures, and of fibrous or cartilaginous organs into bony tissues, fully attest the progress of age. In the brain itself the same causes, and more especially the sympathetic action of the irritated stomach, favour the developement of apoplexies, paralyses, and other diseases of that class.

We may here remark, that nearly all the inflammatory affections occurring in old persons are of a mechanical nature, depending on the obstacle to the circulation occasioned by the calcareous phosphate deposited in the large vessels. Such inflammations may present phenomena, both of an organic and functional nature, more marked even that in the case of young persons. The arteries, being frequently ossified and superficial, will give to the finger a hard stroke, which will convince the inexperienced practitioner of the presence of violent inflammation with powerful reaction, and determine him to have recourse to copious depletion and other antiphlogistic means; with what disastrous consequences it is unnecessary to mention.

MODIFICATIONS RELATIVE TO SEX.

The practitioner should never forget that, on the one hand, the constitution in females is more mobile and more suceptible than in man, and on the other hand there exists in them an organ, whose lesions modify or often complicate other diseases; this organ is the uterus. It is for a considerable part of life the seat of a special function, and of a periodical excitement, accompanied by a peculiar discharge, the course of which must not be interfered with by too active medication, and which must be re-established, when it becomes deranged or suspended by any morbific cause. It is to the presence of this organ in females that nearly all the differences between her diseases and those of the male are owing,—differences which introduce considerable modifications in the employment of therapeutical agents in individuals of the two sexes.

The uterus is, in most women, a predominant organ, and an active centre of sympathies from puberty to the time the menses disappear; it participates in almost all external impressions, which it also serves to modify. Its monthly irritation, and the loss of blood which it occasions, have become in a manner necessary to the system; as long as both continue regular and normal, they contribute to preserve the system from a multitude of annoyances to which its great susceptibility would obviously expose it. When any irritation occurs in the system, and interrupts the menstrual discharge, it becomes so much the more intense, as the vital actions, and the materials which were previously directed to the uterus, become concentrated on the parts newly affected. Then it is that inflammation makes most rapid progress; a larger quantity of blood penetrates the tissues of the inflamed parts, which also evince a tendency to hæmorrhages, which may be naturally considered as supplementary of the menstrual flux.

In treating the diseases of females, the practitioner has in general a double duty to perform ; he must, in the first place, so regulate his treatment that it may not interfere with menstruation, if it be still normal, and, in the next place, he must re-establish this function, when it has been suspended by the existing disease. Strenuously to combat those morbid irritations which have taken the place of the natural orgasm of the uterus, or which have altogether destroyed it, is the first and most important indication to be fulfilled. A large bleeding, by relieving the brain or lungs when these organs are in a state of irritation, will often re-establish the equilibrium, and restore the natural evacuation by the uterus. Under other circumstances, at the same time that we combat the local irritation by means of antiphlogistics and leeches, the application of stimuli to the region of the uterus will direct the fluids towards that part, favour the hæmorrhagic effort, and effect a salutary derivation.

The same rules of treatment will apply in those diseases of females which succeed parturition. In such cases, the genital organs, or mammæ, are either in a state of intense irritation, or, in consequence of some other organ being irritated, and the powers of the system being concentrated on it, these same organs are inert and inactive. The indications are here obvious.

Such are the chief modifications which the difference of sex introduces into medical practice. In every other respect, the diseases of females must be treated on precisely the same principles as those of males.

MODIFICATIONS RELATIVE TO PROFESSIONS.

The knowledge of the profession or ordinary occupation of patients is more useful to the pathologist who endeavours to investigate and discover the causes of the diseases connected with it, than to the practitioner engaged in curing such diseases.

To know the habitual occupation of a patient is frequently useful in pointing out the organ affected, and the nature of the affection. Thus, when a physician has to treat a man complaining of obstinate colicky pain, with contraction and hardness of the abdomen, he will be much assisted by knowing that this individual has been handling lead, and that he is constantly exposed to the emanations of this metal.

HABITS

The domain of habits is no less extensive than their power is great over the actions of the animal economy. The physician should always be acquainted with them; they oftentimes become actual wants, and, when they are of long standing, the system cannot bear with impunity that their gratification should be denied.

The principal habits which the therapeutist has to consider are those relating to diet, clothing, and particular appetites of the patient. Thus, a man who has been accustomed to take large quantities of food cannot sometimes be deprived of them suddenly and entirely, without suffering a feeling of annoyance and distress which must interfere with the successful treatment of his disease. Instances are on record, wherein considerable harm was done by suddenly depriving of their ordinary beverage individuals long habituated to indulge in the copious use of alcoholic liquors. In fact, it is necessary, at least to a certain extent, to respect the state in which the different organs of the body have been placed by long-continued habits of living, so as not to add, without an absolute necessity, a new disturbance to that already resulting from disease.

As the effect of habit is to render the several tissues of the body less sensible to stimuli, the practitioner would do well to remember that medicinal substances, when their use has been resorted to for a considerable time, should be gradually rendered more active, if we wish to keep up and maintain their influence on the system. It is well known that the most poisonous substances may, by long-continued use, become harmless, if the doses in which they are taken be gradually and slowly increased. This remark cannot, however, warrant us in blindly continuing the use of very active medicines; for if it be true that our organs, when for a long time subjected to the power of stimulants, eventually may become insensible to them, it is no less true that they frequently become irritated under their use, and proceed onwards to destruction with more or less rapidity. The judicious physician should always be on his guard against propositions of too exclusive a character, which are deduced from imperfect and superficial observation. His business, when he employs stimuli for any considerable time, is to watch their effects, so as to be able either to augment their strength and quantity, if the patient can bear them well, or immediately to suspend their use, should they irritate the organs to a dangerous extent.

MODIFICATIONS IN THE CURATIVE INDICATIONS ARISING FROM TEMPERAMENT AND IDIOSYNCRASY.

The division of temperaments generally adopted by practical physicians is into the sanguineous, lymphatic, and nervous. Observation fully warrants us in assuming that man is capable of presenting in his organization—1st, modifications produced by exaltation of action and of developement in the sanguineous, nervous, and lymphatic systems; modifications which extend to all the parts of the body into which the ramifications of these systems penetrate, and which may be recognized in each of the tissues, and are capable of impressing a special and particular character on the functions; and 2nd, modifications more restricted, as being confined to the predominance of some one organ, or of some set of organs, and which produce only ympathetically effects more or less sensible in other parts than n those primarily affected. We know from observation that he individuals of a sanguine temperament have the red capillary system more developed, more irritable, and more disposed o acute inflammations and hæmorrhages, than other persons hat those of a lymphatic temperament have all the tissues ofter, more abounding in white fluids, more sensible to the mpression of irritants, and more susceptible of becoming the eat of latent chronic inflammations; whilst persons of the ervous temperament are more sensitive, more impressionable, nd more excitable than those of the preceding temperaments —they have the sympathies far more active and energetic. These are facts derived from observation. It is evident, therefore, that such diversity in the temperaments of different individuals must have more or less influence on the effects of emedial agents, and consequently on the method of cure to be dopted in the treatment of diseases.

We see that, in individuals of a sanguine temperament, inflammations and hæmorrhages are accompanied with intense ascular excitement; the pulse becomes hard, full, and frequent; the tissues, naturally white, often assume a red colour; n a word, the entire sanguineous system becomes strongly xcited. Then it is that congestions threaten those parts on which the sympathies direct and concentrate the vital actions. In some cases the principal viscera become so much excited and gorged with blood, that the functions which they should perform become languid and almost abolished. Under such circumstances, general blood-letting, to an extent proportioned to the patient's strength, will be found the most effectual method of cure; strict abstinence from all kinds of solid food must be enjoined, and the entire array of the antiphlogistic means of cure must be called into requisition.

Those cases wherein the apparatus of innervation predominates, will require the greatest care on the part of the physician. In such cases, irritation excites the appearance of various and unusual phenomena, produced by sympathetic radiations directed towards the principal viscera; there is no proportion between the force with which the irritating cause acts, and the general disturbance it occasions. The phenomena of local irritation are scarcely perceptible; and very intense pain, or spasms, or other such symptoms, become rapidly developed. In these cases the re-action is evidently more nervous than vascular; for in the midst of all this disturbance the pulse is scarcely disturbed, and the circulation is very little, if at all, changed. Such patients must be treated like children, by small doses of medicines, by sedatives, warm baths, rest, mild narcotics, rather than by general blood-letting, which sometimes has the effect of increasing the nervous sensibility, as well as the violence of the symptoms to which it gives rise. Such practice will be found far more successful than that of those routine practitioners who are accustomed to prescribe the most powerful stimulants, under the title of antispasmodics, in what have been called malignant fevers, and in many of the neuroses. In most of these cases the debility is but apparent, and the means most effectual in destroying the local irritation are also those best adapted to restore the equilibrium and harmony of the system. Should blood-letting, however, be required, the local abstraction of blood is to be preferred. With respect to the use of revulsives, so useful in other cases, we may observe that their employment seems to be contra-indicated by the excessive irritability accompanying such cases, as the pain and irritation which they occasion frequently aggravate the severity of the disease. The revulsive treatment, however, is sometimes required.

In individuals characterized by the lymphatic temperament, the vital actions, both in health and disease, are performed with a degree of slowness which has often imposed on the physician as if it were debility. Neither the pulse, nor the digestive organs, nor the brain, are violently affected by the other organs which may be the primary seat of the irritation; everything is calm and tranquil in the animal economy, notwithstanding the local lesion which is attacking, and probably destroying, one of its most important organs. In such cases the various irritations have an extraordinary tendency to pass into the chronic state, to attach themselves to the white vessels, to disturb the functions of nutrition, and to give rise to the formation of new tissues, which themselves are rapidly destroyed. In these cases, the physician must not let himself be deceived by the absence of local heat, and by the tranquil state of the circulation. To remove the state of irritation, emollient topical applications, local bleeding in small quantity, but frequently repeated, must be resorted to, as also permanent revulsives. When, however, reaction no longer exists, bitters, tonics, and sometimes stimulants, so seldom useful and so often injurious in other constitutions, may be employed with advantage.

It sometimes happens that a predominance of action is observed to exist in one or more organs, such as the heart, lungs, liver, stomach, genital apparatus, articulations, &c. The effects of this will be to convert the parts which are the seat of such predominance into so many centres, to which all the sympathetic irradiations are directed. Stimulation, even though applied to remote parts, is soon felt by the most sensitive and irritable organ. Thus in cases where the predominance of vital action exists in the stomach, kidney, &c., a strong mental excitement, the impression of cold and moisture, or any other such cause, will be sufficient to excite severe gastric or renal symptoms.

With respect to the sympathetic lesions occasioned by local irritation it may be observed, that, though consisting at first in a disturbance of function, these lesions may be soon followed by evident change of structure in such parts. A very serious practical error it is to suppose that the irritations excited sympathetically in the organs of the body are of little consequence. Such irritations are not unfrequently found to take deep root in the organs affected by them ; and, though at first only subordinate to the primary irritation which gave rise to them, they soon, in their turn, become idiopathic, and have a tendency to disorganize.

It is of great importance that the practitioner should be acquainted with the idiosyncrasy of his patient ; such knowledge serves to point out the direction which the sympathies may take, and to explain why, in certain cases, all the impressions seem to affect some one particular viscus in preference to others. He should direct particular attention to the predominant viscera, and not confound the symptoms arising from them with those of the primary morbid lesion which may have called them forth. With respect to treatment, his object should be to remove or combat the over-excitement which may become developed in the organ whose action and sensibility are habitually exalted. Sometimes, however, when such organ is not a vital one, and when it is situated externally, it may become a salutary point of revulsion in dangerous visceral inflammation. Thus in gouty patients, or in persons who are frequently attacked with rheumatic pains or cutaneous eruptions, the physician will often find it of good service to establish irritation on the joints and skin, in order to displace others situate on some vital organ.

In my opinion, practitioners do not pay sufficient attention to the irritations occasioned by the play of sympathies. It may, I think, be laid down as a principle, that as soon as these irritations have attained a certain degree of severity, and have lasted for some days, they should be combated as if they were primary, and we should divide our attention between the organ primarily and that secondarily affected.

MODIFICATIONS RELATIVE TO APPETITES.

The skilful practitioner will not fail to inquire whether there are any particular objects of food or drink to which the patient evinces a decided repugnance; such articles he never should prescribe. Some persons are made very sick by tartar emetic, and yet cannot be made to vomit by it; of course, when it is absolutely necessary to make such persons vomit, some other article of the materia medica should be employed. The peculiar appetites sometimes excited in patients by the peculiar state of the affected organs also merit the attention of the practitioner. It is very difficult to say generally when we should comply with such appetites, and when resist them. They form, in a manner, one of the symptoms of disease, and may be considered as the expression of the wants of the system in the state of derangement in which it is placed. In such cases the practitioner must exercise his own judgment; he must compare the state of the patient with the known effects of those articles which are the objects of his desires. If he find that such substances may really be useful, he should allow the patient to have them, and prefer them to every other: when, again, he knows them to be decidedly dangerous, he should refuse them.

CHAPTER V.

ON THE MODUS OPERANDI OF MEDICINES.

Properties of medicines, physical or chemical—Cases wherein medicinal actions are confined to place of application—How medicines affect remote organs—Prevailing theory of remote medicinal action—Remote actions how divided—Difficulties of the prevailing theory—Injection of medicinal substances—Laws regulating the absorption of medicinal substances, and distinguishing remote medicinal actions produced by absorption from those produced by nervous sympathy—What is necessary for the dynamical action of a medicine—Laws characterizing sympathetic action—How the blood and medicinal substances re-act on each other—Phenomena analogous to the elective affinities of certain organs for certain medicines.

EVERY medicinal substance possesses a peculiar power, which may be explained either by its physical or chemical qualities, and which is only developed on being incorporated with the living organism. When the medicinal substance and organism come together, there occurs in the latter a series of changes and phenomena which go by the name of medicinal action.

These changes in the vital phenomena, called forth in the animal organism by this application of a medicinal substance, are either confined to the place where the latter was applied, or they manifest themselves in organs remote from the place of application, or the medicinal substance exerts its influence only

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* The substance of this chapter has been condensed, in a great measure, from a work entitled "Theorie der Arzneiwirkungen," Von Dr. A. Herr, Freiburg.

on the latter, without either structural or functional changes being observable in the place of application.

The case wherein medicinal actions are confined to the points of application occurs:

1st. If the medicinal substance possess no peculiar activity. Examples of this are afforded by those substances which are called indifferent, such as mucus, fat, &c.

2nd. If the substance employed is applied in a proportionally small dose, and to an unimportant organ. The latter limitation refers, however, only to those medicinal substances which produce local changes of structure. For those may, though in very minute quantities, produce changes in important organs, to such an extent as to give rise to sympathetic results, even in remote parts. This would occur, for instance, if a drop of sulphuric acid, or a small particle of nitrate of silver, were applied to the eye. On the contrary, these substances, if applied to the thigh, will produce only a local action. The matter is otherwise with those medicines which produce locally no perceptible changes of structure. In these, the medicinal action, if the dose employed was small—even though the application was made to the most important organs—is limited to the point of application, though these substances in any considerable dose always produce effects in organs remote from the place of application. Thus a drop of a solution of the extract of belladonna, when applied to the eye, produces in this organ merely dilatation of the iris. The monkshood, when chewed, occasions, according to Brodie, a feeling of numbness in the lips, which continues for some hours, without giving rise to any other symptom. The following experiment appertaining to this point is communicated by Robiquet; the substance used was prussic acid. When the vapour of this acid is kept for some time applied to the fingers in a glass tube open at both ends, Robiquet remarked that the extremity of each finger so applied was benumbed, and that it continued in this state for more than a day. Similar instances may be adduced generally in the case of all narcotic substances.

It is only under the circumstances here mentioned that the medicinal substance will confine itself to the place of application. In all others we may observe changes in the vital phenomena, even in remote organs. The question now presents itself, how can a medicinal substance exert an influence on parts remote from the place of application?

The common and very generally prevailing opinion is, that the nerves transfer the local impression made by the action of the medicinal substance to remote parts and organs. According to this view, the remote actions of medicines are divided:

1. Into those which may be accounted for by the consensus of the nerves. This is again divided into sympathetic and antagonistic. With respect to the former, it is supposed that the local influence exerted by a medicinal substance is extended to the brain by means of the nerves, and that from this organ the individual action is again transferred to a remote organ through the medium of the nerves. Others consider the sympathetic nerves as the mediators of this species of medicinal action. In the sympathetic actions of medicinal substances, the state excited in the remote organ is similar to the local state. Antagonistic medicinal action is also no doubt effected through the connexion of the nerves; it is, however, distinguished from the preceding in this, that the state excited in the remote organ is opposite to that locally produced by the medicinal substance. This species of medicinal action in remote organs is only effected by those means which are capable of producing a degree of irritation on the place of application. Under this head we may class purgatives and emetics, as also rubefacients, vesicants, and caustics:

2. Into those actions which are occasioned by proximity of

parts. It is a certain fact, that many medicinal substances, when applied to a part, do not confine their action merely to the part, but that their influence extends through all the tissues to the subjacent parts and organs. The medicinal action is here supposed to extend by radiation. This kind of action is said to be occasioned by contiguity of parts, because it cannot be explained from the course of the nerves. Thus we see that medicinal substances, when applied externally to the abdominal parietes in diseases of the stomach, bladder, &c., are capable of exerting a certain degree of action on the part affected.

According to this theory, it is admitted as a fact, that medicinal substances exert a material action only on the place of application, and that the structural and functional changes produced in remote organs depend on the local action of such substance.

It is certainly not to be denied that there are medicinal substances which produce all their consecutive effects in remote organs only through their influence on the place of application; and equally certain is it, that all medicinal substances which locally produce either structural change or functional disturbance in an organ, must, in like manner, necessarily produce a reaction in remote organs, especially those which sympathize with the former.

Notwithstanding this admission, it will be seen, on a careful investigation of the subject, that we are but too frequently unable to account, in the way now mentioned, for the phenomena which follow the exhibition of a medicine. We may still further satisfy ourselves that we can, for the most part, explain the remote effects only by admitting that a material action of the medicinal substance passes to remote organs from the point of application. But such a material action can only take place by the medicinal substances entering into the circulation.

However, before I dwell longer on the assertion now made, it will not be irrelevant to enumerate all the difficulties which stand in the way of the prevailing theory of medicinal actions.

1. In every mode of applying medicinal substances, several of them have been found in the blood; as iodine, arsenic, mercury, &c., from the mineral kingdom; oil of turpentine, camphor, assafœtida, indigo, from the vegetable kingdom; musk from the animal kingdom. But the finding of substances in the blood is opposed to the idea that medicinal substances act only from the place of application. For it is not to be denied that a substance circulating in the blood must also act more or less on the parts with which it comes in contact. Just as little can it be denied that if a medicinal substance, whose entrance into the circulation is proved, produces not only local actions, but also actions in remote organs, it is natural to admit that the actions on remote organs were occasioned only because the substance circulating with the blood came in contact with these organs.

It may, perhaps, be objected that the substances found in the blood only sometimes pass into it. But then it must be shown that a medicinal substance, as often as it was found in the blood, always acts in a way different from the ordinary way. With respect, however, to the possibility of showing such a thing, experience has already decided in the negative.

2. After the internal as well as the external application of several medicinal substances, they have been again found in the secretions and excretions. We know how many such substances have been found in the urine. And it must be admitted that they could not have reached the urine, or the other secretions and excretions, unless they had first found

their way into the circulation. It may be objected that several substances have been found in the secretions and excretions, but not in the blood. This objection, however, is easily met by recollecting how much more difficult it is to detect substances in the blood, than, for instance, in the urine, by chemical re-agents or otherwise. To meet the difficulty, some have believed in the existence of secret urinary passages; but since it became known that substances readily recognizable can be detected in the blood even after the lapse of two minutes by chemical re-agents, and always earlier in this fluid than in the urine,* and as it is also known that the circulation of the blood through the entire body takes places in a still shorter time, it cannot occasion surprise if in from four to five minutes after swallowing a medicine, traces of it can be found in the urine, and more especially since this takes place in other secretions, as in the pulmonary transpiration, in which no secret passages are admitted or assumed, just as soon, and even sooner.†

3. Medicinal substances, after being applied in any way, have been found deposited in the solids of the body; thus mercury has been found in the brain, muscles, bones, &c., of persons who have taken any of the preparations of this substance.

4. Rhubarb applied to the surface of the wound in an amputated leg, produced violent purging on the following day, combined with a nauseous, bitter taste in the mouth.‡

Krimer made an incision on his forearm, which was but skin-deep, on which he sprinkled four grains of tartar emetic; no symptom of nausea or vomiting followed. On making another cut which penetrated as far as the muscles, and sprinkling two grains of the same substance on it, nausea, sickness, and considerable vomiting took place in about an hour and a half.*

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* Ueber das Einsaugungsvermögen des Grossen und Kleinen Kreislaufsystem v. Prof. Meyer, in Meckel's Archiv. Bd. 3. H. 4. s. 497.

† Versuche über das Verhältniss der Zahl der Pulse und der Schnelligkeit des Blutumlaufs von Prof. E. Hering, in Tiedemann's Zeitschrift f. Physiologie, B. 5. H. 1. s. 58—93.

‡ Med. Chir. Zeitung, 34. Ergänzungsband. 1831.

In a case of paralysis, Raciborski applied strychnine to the nape of the neck according to the endermic method, and observed that after two hours it uniformly excited a sense of formication in the paralyzed parts, which after some time extended from the big toe to the head.† Several medicinal substances, applied endermically, were observed not to produce their action on remote organs till a considerable time after their application. Now so tardy an appearance of the remote effects is in obvious and direct contradiction to the laws of sympathy; for wherever a local produces a sympathetic action on a remote organ, the two actions are observed to take place simultaneously.

It is a matter of daily observation, that if an organ is in any way injured or disturbed in its functions, the reactions on other organs are so much the greater, the more important the affected organ is. Accordingly, we are warranted in concluding that the same medicinal substance will act more energetically on remote organs, the more complex the organization of that part be, which is affected locally by the medicinal substance. It will further be admitted that one and the same medicinal substance will act more powerfully and more rapidly, when introduced into the stomach, than when introduced into the anus or cellular tissue, especially when the active substance is applied to the latter in an unimportant part, as, for instance, in an extremity. This, however, is contradicted by experience. Many mineral, and almost all narcotic remedies act more rapidly and more violently from the cellular tissue, than when they are introduced into the stomach. According to Dupuytren, opium acts always more powerfully from the rectum than when taken into the stomach.

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* Horn's Archiv. f. Medic. Erfahr. 1816, II. 5. s. 924.

† De la méthode endermique appliquée à quelques lésions du système nerveux. In Journal hebdomadaire des progrès des Sciences, 1835, Nov. 26, p. 396.

Again, if the remote actions of medicinal substances depend on the local impression of the latter, we are warranted in admitting that the same medicine will produce so much the more powerful reactions in remote organs, the greater the local impressions be. Such an inference is not, however, borne out by experience. It is well known that in certain cases arsenic kills with extraordinary rapidity, by destroying the activity of the central organs of the nervous system. In other cases, when it is given in the same quantity and under similar circumstances, symptoms of gastric inflammation and death follow, without any perceptible disturbance of the cerebral functions, not till after one or two days. In the first rapid form of death, and where more serious disturbance took place in remote organs, no structural change whatever was found, but in the latter the stomach was violently inflamed. Now, if the action on remote organs depended on the local impression, the very contrary should have taken place.

From a vast number of experiments made by several persons, it may be safely inferred that the effects of medicinal substances on remote organs are neither entirely dependent on their local actions, nor on the conducting power of the nerves, but on the absorption of these substances into the circulation. Another proof that the action of medicinal substances depends on their absorption, is, that the same effects are produced when they are immediately injected into the blood, as when they are taken in the ordinary way. A short time after the discovery of the circulation, medical men used to inject medicinal substances immediately into the blood. The original discoverer of this mode of administering medicines is not known.*

We have now considered the principal objections to the theory, which maintains that the effects of medicines on remote organs depend on the conducting power of the nerves.

In almost all cases where a medicinal substance acts, as it is said, dynamically, the remote medicinal actions cannot be produced by nervous sympathy or nervous conduction. But if the remote actions of medicinal substances are not produced through nervous conduction, there still remains but one way, according to the present state of physiology, to account for them. It must in fact be admitted that medicinal substances reach the affected organs themselves. But in most cases † this can only happen by these substances being absorbed, and thus entering into the circulation. In addition to what we have now said, it is further necessary to establish laws which may determine when medicinal actions cannot be explained according to the theory of nervous conduction, and when the entrance of medicines into the blood must be admitted as proved. Such an entrance must be admitted—

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* Some persons consider Medea as the discoverer of this mode of applying medicines: whence it has been called *Cura Medeana*. The following lines from one of Ovid's Fables (Metamorphos, l. vii. v. 285—293,) gave rise to this opinion.

> Quod simulac vidit, stricta Medea recludit
> Ense senis jugulum: veterem exire cruorem
> Passa, replet succis. Quos postquam combibit Æson,
> Aut ore acceptos, aut vulnere; barba comæque
> Canitie posita nigrum rapuere colorem;
> Pulsa fugit macies: abeunt pallorque, situsque;
> Adjectoque cavæ supplentur sanguine venæ;
> Membraque luxuriant. Æson miratur, et olim
> Ante quater denos hunc se reminiscitur annos.

A striking difference seems to exist between Medea's mode of operating and that of modern experimenters: she allowed all the old blood to escape before she introduced her renovating juices. Such a bold operation would scarcely be now attempted; the timid practitioners of the present times would apprehend something very like a fatal syncope.

† "In most cases;" for it is now ascertained that medicines may

1. *If the medicinal substances are found in the blood.* These may be found in various ways, as for instance in several medicines from the mineral kingdom by chemical re-agents. Such detection is more difficult, nay almost impossible, in the case of medicines from the animal and vegetable kingdom. Here we are obliged to have recourse to other means of detection, which in many cases, however, are satisfactory. Thus we discover prussic acid,* alcohol,† assafœtida, by their odour;

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reach remote organs by penetrating directly through the tissues lying between the latter and the place of application.

The powers or properties of medicinal substances have been divided into—1st, Physical or Mechanical; 2nd, Chemical; and 3rd, Dynamical. By the *physical properties* of medicines are understood those which depend on their cohesion, form, weight, &c.; thus metallic mercury acts by its weight; oily and mucilaginous substances produce certain relaxing or soothing effects by their peculiar form and consistence. The action of concentrated acids, or of alkalies, on the organic tissues, affords an evidence of the chemical powers of medicines. The medicinal substances possessed of mechanical and chemical properties, produce changes in the form, composition, &c., of the organs or constituents of the body, sufficiently obvious. There are several substances, however, which exercise great influence on the animal organism, though their action is not marked by any recognisable change in either the form or composition of any parts of the body; such powers of medicinal substances are called *dynamical*. These powers have by some been considered of an electrical nature.

* Emmert in Meckel's Archiv. B. 4. H. 1. S. 20. In Hufeland's Journal d. prakt. Heilk., B. 52. H. 1. s. 76.

† Magendie in Meckel's Archiv., B. 3. H. 4. s. 576.

indigo,* red-colouring matter,† and other substances, may be discovered in the blood by their colour. The taste would certainly warrant us in inferring the presence of certain medicinal substances, as bitters, in the blood. There is satisfactory proof of the presence of certain medicinal substances in the blood, when this fluid is found to possess the medicinal powers of the former. A beautiful experiment relating to this point was made by Verviere.‡ He tied the foot of a dog with a strong ligature, so that the circulation could take place in the arteries, but not in the veins, and introduced a portion of extract of nux vomica into a recent wound in the paw. He then took a quantity of blood from a vein opened between the wound and the ligature, and introduced it into the vein of another dog. This animal died, after some time, with the ordinary symptoms produced by nux vomica. The other animal from which the blood was taken, was, on the contrary, not at all affected, when a sufficient quantity of blood was taken from it before removing the ligature.|| Here there can be no doubt of the entrance of the nux vomica into the blood.§

2. *If medicines are found in the secretions and excretions.* Thus, by the sense of smell we frequently detect substances in the pulmonary exhalation, as, for instance, oil of turpentine after its application to a carbuncle on the back,¶ garlick when

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* Traité Elémentaire de Matière Médicale, par J. B. G. Barbier. Paris, 1830, tom. iii. p. 398.

† W. Schwarze, Systematische Arzneimittellehre, Leipz. 1826, B. 2. Abth. 2. s. 241.

‡ Journal des Progrès des Sciences Med., 1827, tom. iii. p. 121.

|| Magendie, who instituted similar experiments at an earlier period, failed in producing the same effect. Journal de Physiol., t. i. p. 28.

§ On the same point, see Christison on Poisons, and Stevens' Observations on the Healthy and Diseased State of the Blood. London, 1832.

¶ Wedemeyer Untersuchungen über den Kreislauf des Blutes. Hanover, 1828.

rubbed into the soles of the feet, or administered in the form of clyster, and camphor when injected into the thoracic cavity of dogs.* The odour of clove, cinnamon, aniseed, &c., has been observed in the breath of persons who have taken these substances; the odour of musk and of camphor has been observed in the urine of persons who have taken these substances internally. Numerous other instances may be mentioned, which prove the same thing.

3. *If the susbstances employed are found deposited in the solid parts of the body.* Pickel found quicksilver† in the brain by means of chemical re-agents. Lead has been found in the spinal chord, muscles, and liver, &c.‡ Humbold and Bonpland relate that children who ate of the fruits of the Gustavia Spinosa became all over of a yellow colour.§ It is well known that the nitrate of silver, when taken internally, darkens the colour of the skin.

4. *When, after the application of a medicinal substance, the effects of the same on remote organs do not follow till a late period, and in every case perceptibly later than the local effects.* A great many medicinal substances come under this law; as all our tonic and narcotic medicines.

We must, however, beware of admitting that all medicines, on the contrary, and among others prussic acid, which produce effects on remote organs very speedily after their local application, cannot therefore act till after being taken into the blood. But as the rapid action of some medicines, and among the rest, of prussic acid, has frequently been adduced as an argument against the opinion that medicines do not act till after their admission into the blood, it may be well to consider here what force this argument has. It certainly cannot be denied that prussic acid may kill in a few seconds, but yet this may happen, even though it does not act till after it passes into the blood. The grounds for this supposition are, the rapidity with which foreign substances are carried into the blood. This rapidity is proved by Hering's experiments.* He poured some ferro-prussiate of potash into the cervical veins of some horses, and observed at what time this substance could be found in the blood of different vessels, but especially in that of the cervical veins of the other side. He found it in the maxillary artery after from ten to twenty-five seconds; in from fifteen to twenty seconds in the masseteric artery, and after from twenty to thirty seconds in the metatarsal artery; in from twenty to twenty-five seconds in the jugular vein of the other side; after from twenty-three to thirty seconds in the external thoracic vein; and after twenty seconds in the saphena vein. Tiedemann's experiments go to establish the same point.†

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* Recherches Expérimentales sur l'Exhalation Pulmonaire. In Repertoire Générale d'Anatomie et de Physiologie Pathologique, t. iii. p. 74. 1826.

† Orfila on Poisons.

‡ Tract. de Effectu Plumbi in Organismo Animali Sano, &c. Auct. Wibmer. Monachis, 1829.

§ Abhandl. der Arzneikrafte von Dierbach. Lungo, 1831.

The rapidity with which medicines are absorbed and taken up into the circulation may also be inferred from the circumstance that some medicinal substances have been detected in the secretions a few minutes after their exhibition. Thus, the smell of spirits of wine, which had been injected into the abdomen of a dog, was detected in three minutes' time in the pulmonary exhalation.‡ Prussic acid and other rapidly acting substances produce their effects with equal rapidity on remote organs, even

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* Zeitschrift f. Physiologie von Tiedemann, &c. 1834—H. 1. s. 89—126.

† Die Ausdunstung der Lungen durch Versuche erläutert.

‡ Recherches Experim. sur l'Exhalation Pulmonaire. In Repertoire Générale de l'Anatomie et Physiologie Pathologique, t. ii. 1826, p. 178.

m parts whose nervous communication with the trunk has
en removed, and where accordingly no nervous conduction
m the one to the other is possible. Wedemeyer instituted an
periment on a dog, in which the spinal chord was divided, and
ere prussic acid began to exercise its action on the brain after
e minute, though this acid was introduced into a wound of
e hind-foot. As important proofs that even in cases where
e action of substances on remote organs was most rapid, this
uld take place not till after they were taken into the blood,
might adduce the experiments of Segalas with alcohol and
x vomica.* When these substances were injected into the
r-tubes, in the former case intoxication, and in the latter
tanic convulsions, followed as rapidly as if they had been in-
cted immediately into the blood, that is, almost instantane-
sly: when the par vagum was tied, the same thing took place,
d with equal rapidity. It cannot, therefore, be admitted
at an impression occasioned locally by the above-mentioned
bstances was conveyed to the brain and spinal chord by the
lmonary nerves, as the connexion between both was destroyed
the division of the nervus vagus; and therefore it remains
r us to admit, that those substances were absorbed with the
eatest rapidity in the bronchi, and, circulating with the blood,
me in contact with the brain and spinal chord.

This may suffice to show, that the rapidity with which a me-
cinal substance acts, is not alone sufficient to justify the
sumption, that this action is independent of its absorption
o the circulation. This could only be admitted in the case
here, between the local action and the remote phenomena, no
preciable interval whatever could be observed.

5. *When, on the application of a medicinal substance, neither*
ructural nor functional changes occur at the place of applica-

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* Froriep's Notizen, b. 14, s. 249—253.

tion, but on the contrary, considerable effects are produced on remote organs.

This peculiarity is found in but very few substances, and is chiefly observable when they are applied externally to the skin.

6. *When a medicinal substance, no matter how various the forms and ways in which it may be applied, always produces the same phenomena.* Instances of this are afforded by narcotic, stimulating, and tonic remedies.

7. *When one and the same medicinal substance given in the same dose does not produce stronger remote effects proportioned to the importance of the organ to which it may be applied.*

This is the case with all metallic, narcotic, and stimulating medicines.

8. *When one and the same medicinal substance produces sometimes greater, sometimes less effects at the place of application, and when these do not produce corresponding remote effects; that is, when intense local effects are not followed by equally intense phenomena in remote organs, but, on the contrary, the more intense the remote effects are, the less the local symptoms are found to be.*

To this class belong such substances as sometimes excite local inflammation, sometimes not. Their remote effects are always less in the former case than in the latter.

9. *When a medicinal substance, applied to a part or organ whose nervous connexion with the rest of the body is cut off, still exerts its influence on this, and with it also on the central parts of the nervous system.*

10. *When, the nervous communications continuing perfectly entire, but the circulation of the blood being cut off in a part of the body, a medicinal substance applied to this part produces no action on remote organs.*

Under this head come narcotics, stimulants, &c.

11. *When a medicinal substance, after local application to a wound, produces no action on remote organs, so long as its absorption is impeded by any means, but on the other hand acts, if nothing interferes with its absorption.*

12. *When the activity of a medicinal substance is diminished, nay perfectly destroyed, by an artificial plethora.*

13. *When a substance applied to parts not furnished with nerves, yet produces effects in distant organs, even when locally no change of structure whatever is observed.*

14. *When medicinal substances introduced immediately into the blood act in just the same way as when they are taken internally, or exhibited in any other way.*

15. *When a medicinal substance gradually disappears at the place of application, that is, is absorbed, and occasions in distant organs effects which correspond with the disappearance of the medicinal body.*

These laws are sufficient to distinguish remote medicinal actions, which must be accounted for by the entrance of medicines into the blood, from those produced by nervous sympathy. The matter, however, will be rendered still easier by a statement of the properties of sympathetic medicinal action. By accurately appreciating remote medicinal actions, we shall be enabled to know whether a medicinal substance enters into the blood or not; or, in other words, whether all the phenomena occasioned by a medicine are merely the consequence of its local action, or whether they depend on its reception into the blood. We shall even be able to distinguish what remote actions of a medicinal substance must be ascribed to nervous sympathy, and what to its absorption, when both species of remote action are produced by the same substance.

Though medicinal action cannot be accounted for from the physical or chemical properties of a substance, still it must be acknowledged, that a substance influences a living body sometimes rather through its physical or its chemical properties; or, finally, through a power which is only known, when the substance has been brought into contact with the living organism. Thus, metallic quicksilver, mucilaginous and oily substances, act through their physical properties; concentrated acids and alkalies act through their chemical properties; and in a third way chiefly, though not exclusively, those substances act, which produce no perceptible changes on the place of application, as narcotics, for instance, volatile stimulants, &c. At first sight, it appears desirable to limit the meaning of medicinal substances in such a manner as that those only which act dynamically, as it is said, should be considered such. Such a restriction, however, besides violating the common use of language, would be impracticable. For, in the first place, one and the same substance acts, according to its state of aggregation, sometimes chemically, sometimes dynamically; as, for instance, nitrate of silver, sulphuric acid, &c. In the next place, there are very many substances which act, at least in part, locally, though their principal action is dynamic; as in most metallic substances, spirits of wine, &c.

Though in every species of action produced by a medicine the animal system is never passive, still the first momentum of the chemical and physical action of a medicinal substance proceeds entirely from the latter, and it is only the following reaction, as indicated by pain, afflux of the fluids, inflammation, &c., that appertains to the organism. This first momentum of action continues equally, whether the medicinal substance be applied to parts furnished with nerves or not.

The case is different with substances acting dynamically. When applied to tendons or other nerveless parts, they manifest no local action whatever, unless they also act by virtue of a physical or chemical property. The first condition, therefore, necessary in order that a medicinal substance should act dy-

mically, is, that it should first come into immediate contact
ith nerves. But as our body is covered with a nerveless mem-
rane, the epithelium and epidermis, it must be admitted that
medicinal substance can only act dynamically when it has
enetrated this membrane. It follows, therefore, that in order
effect the local operation of a substance acting dynamically,
must be absorbed. This view of the matter is justified by
e circumstance, that all medicinal substances which act dyna-
ically are capable of exciting a local action only when some
me has elapsed after their employment. If a solution of ex-
act of belladonna be applied to the eye, dilatation of the
upil does not take place immediately, often not till after
e lapse of half an hour; that is, not till after the medicinal
bstance has reached the ciliary nerves. This local action fol-
ws most rapidly in the case of prussic acid, and of volatile
imulants, but this is directly proportioned to the rapidity with
hich the substances pass into the blood. It may be readily
nceived, that a substance which has penetrated through the
idermis, &c., has already reached the circulation, and, being
rried along with the circulating blood, exerts its action on
her organs. From this circumstance one may accordingly
fer, that the remote effects produced by dynamically-acting
bstances are not produced till after their entrance into the
ood, unless the local medicinal effects excited by them be
nsiderable.

With respect to substances which act by virtue of their phy-
cal properties, they may produce a first momentum of action
ithout coming in contact with nerves. Metallic mercury will
ccasion pressure, ice will cause coldness; mucilaginous and oily
bstances will relax. But in order that a medicinal effect should
ccur, the aforesaid actions of weight, cold, &c., must extend to
e nerves. Now this effect may be produced through the me-
um of a nerveless part, as through the epidermis, and accord-

ingly without the medicinal substance and the nerves immediately meeting. But such a substance also can act, at least, partly, only when it comes into immediate contact with the nerve. But this is possible only in such physically-acting substances as do not lose their physical properties by absorption. Medicinal substances acting physically ordinarily produce in remote organs no medicinal effects; but should this happen, it is so far a consequence of the absorption of the substance, as we may suppose that during this the active physical property is not lost, as oil, for instance, does not lose its demulcent or relaxing property by this process. But the remote effect in this case may be referred to the laws above stated. In all other cases the remote effects produced by these substances are to be looked on as consensual or sympathetic.

With respect to substances acting chemically, they are capable of producing changes of structure in every organic part. But medicinal effects can only take place by their acting on the nerves, and this is possible only by their destroying the protecting parts. They cannot be absorbed, because they destroy all the organic parts with which they come into contact, as long as they possess a certain state of aggregation, and consequently the absorbing apparatus itself. But if they have lost this state of aggregation, they can no longer, when absorbed, act in the same way on remote organs. Their remote effects, therefore, will be ordinarily accomplished through the consent of the nerves. This holds good unconditionally only of such substances as act purely chemically, as, for instance, of the concentrated mineral acids, &c. With respect to other substances, which on the one hand act by virtue of their chemical properties, and on the other act dynamically, as in the case of corrosive sublimate, the remote effects may be explained, partly by the consensus of the nerves, and partly by their entrance into the circulation.

Now whether the medicinal substance has occasioned a local action chiefly through a physical or chemical power, or dynamically, certain it is that no local disturbance can continue for a long time without the rest of the system participating in it, more especially if the part acted on is very important, or seriously injured. We may now safely lay down the following rule:

When a medicinal substance has produced considerable local changes of structure or function sympathetic effects, to a greater or less extent, must also necessarily be produced in remote organs.

The question now is, how such remote effects occasioned by nervous conduction are to be distinguished from those which are produced only by the entrance of the substance into the circulation? The answer to this question appears the more difficult, and at the same time the more necessary, because in one and the same substance both species of remote actions may exist. Nay, even one and the same medicine, under certain circumstances, excites sometimes only local, and in consequence of this, sympathetic remote effects; or it excites local, sympathetic, remote, and such remote effects as can only be accounted for by absorption; or, lastly, it excites no local and no sympathetic remote effects, but only such remote effects as can take place only by the entrance of the substance into the blood. Arsenic, for example, when taken in large doses, occasions almost instantaneously only gastric inflammation, and sympathetically in other organs such disturbances as always accompany this affection; or these phenomena are blended together with symptoms which denote an affection of the brain and chord; or, finally, inflammation with its sympathetic accompaniments is absent, and the arsenic affects only the brain and chord. All these various modifications of action are produced by this substance under the same form, dose, and under apparently similar circumstances.

In order to solve the above question, we should know the properties of both species of remote medicinal reactions. The peculiarity of remote medicinal actions, which are to be accounted for by the reception of the substance into the blood, has been already explained by the laws laid down on the subject; and the most essential character of these consists in this, that they cannot be accounted for according to the theory of nervous sympathy. Sympathetic remote effects have, on the contrary, this peculiar property, that they can be accounted for according to this theory, and that the above-mentioned laws cannot be applied to them. Only, by way of example, we will here lay down some limitations, from which it may be inferred when a remote effect is a sympathetic one. Much detail is unnecessary here; because these limitations always include in them the opposite of the above laws, and therefore may be easily ascertained.

1. *When the remote action of a medicinal substance is a sympathetic one, this must correspond in strength with the local action.*

Thus, concentrated sulphuric acid occasions over the rest of the system a state of suffering so much the greater, the greater the injury is which it occasions locally. The case is different in medicinal substances, in which all, or at least the most important, remote actions depend on their entrance into the blood; for in the latter the effect on remote organs is less, the greater the local changes of structure are. The same holds good of tartar-emetic, arsenic, cantharides, and, in short, more or less of all substances which are capable of exciting local inflammation.

2. *The remote action, in case the nerves are the means of conduction, becomes so much the more intense, the more important the organ is which is locally affected by the medicine.*

Thus inflammation of the stomach, occasioned by nitrate of silver will give rise to more violent symptoms in remote organs, than an equal extent of inflammation produced for instance on the foot. We have already seen how different the case is with those substances which act on remote organs only through absorption. Thus narcotics act more rapidly, and in some respects more violently, when applied to the cellular tissue, than when introduced into the stomach.

3. *A sympathetic action, which would manifest itself in a remote organ, may be in part at least avoided, by cutting off the nervous connexion between the place to which the substance is applied, and the rest of the body.*

We know how different the case is with those substances which produce remote effects through absorption. Christison and Coindet's experiment proves the truth of this law. They found that oxalic acid, when given in a very concentrated solution or in the solid form, destroys the tunics of the stomach, and produces inflammation of this viscus; whereas, when this substance is much diluted with water, it kills considerably sooner, not occasioning a trace of inflammation, but chiefly affecting the heart and spinal chord. If the nerves going to the stomach be divided in animals as like to each other as possible, in those which take concentrated acids the poisoning (the remote effect) is delayed; whilst in those that take the diluted acid death follows with equal rapidity, whether the nerves be divided or not.

4. *The remote effects occasioned by consensus of the nerves, and which are solely the consequence of the local medicinal action, follow always immediately after the local action, cannot take place without this, are not prevented by an artificial plethora,* &c.

We have now seen that the greater number of medicinal substances do not produce their effects till after they have entered the circulation, and become mixed with the blood; the means by which they make their way into the torrent of the circulation may not be unworthy of some consideration. Experiments the most satisfactory have proved that medicinal substances may be taken up into the circulation from the entire surface of the body, from the entire tract of the intestinal canal, from the mucous membranes of the air-passages, &c. &c. It is also known that the coats of the blood-vessels are pervious to medicinal substances; but whether these substances are taken up mediately through the lymphatic vessels, or immediately through the blood-vessels, and so brought into the blood, or whether they reach the circulation in both ways, is not so clearly made out.

In determining this matter it should be kept steadily in view that the question is, whether medicinal, and therefore heterogeneous, unassimilable substances, but not whether all, and therefore assimilable matters, are brought into the blood by the lymphatic vessels, or by the blood-vessels. It is certain that the latter (assimilable substances) are carried into the blood exclusively by the lymphatics, and that chyle has been but very rarely found in the veins of the intestinal canal. No inference, however, can be drawn from this regarding the relation subsisting between the absorbents and medicinal substances. From repeated experiments, instituted for the purpose of determining this question, the following inferences have been made. In support of the absorbing power of the blood-vessels, with respect to heterogeneous medicinal substances, we have:—

1. The observation that medicinal substances enter the blood on coming in contact with the parietes of the blood-vessels.

2. In support of the absorbing power of the blood-vessels, and against that of the lymphatics, with respect to heterogeneous substances, we may adduce the more frequent occur-

rence of the latter in the blood, and their very rare appearance in the lymph and chyle.

3. In support of the absorbing power of the blood-vessels, we have the experiment that absorption takes place in parts of the body which possess no absorbents.

4. For the absorbing power of the blood-vessels, and against that of the lymphatics, we may adduce the rapidity with which certain substances enter the blood.

Wherever a medicinal substance is applied, whether to the air-tubes and bronchi, or to the surface of the body, after they have penetrated the non-vascular epidermis or epithelium, they meet with a fine, delicate network of blood-vessels, diffused over every part, which presents to medicinal substances a much greater surface than the lymphatic vessels do in any part. The probability that any considerable quantity of those substances is taken up by the absorbents, would accordingly be rendered extremely doubtful on these grounds; and still more so, if these vessels, as is not unlikely, have the power of absorbing only by their roots, but not of admitting such substances to pass through their coats.

But supposing the parietes of those vessels were as pervious to medicinal substances as those of the blood-vessels, still the former will not only bring a much smaller quantity of them into the blood than the blood-vessels, because they present a smaller surface to the medicinal substance, but also on this account, because the fluid contained in them reaches the blood very tardily. It is not sufficient that medicinal substances should penetrate a vessel, but when they have entered it, it is necessary that they be carried on with rapidity, in order that they may act on the entire body. This property of rapid conveyance we know the blood-vessels possess. Thus Mayer found ferro-prussiate of potash in the blood two or three minutes after a solution of it was injected into the air-tube of an animal.[*] Westrumb found iodine in the urine of a dog ten minutes after its internal exhibition. In the case of a boy with congenital prolapsus vesicæ, Stehberger, after administering internally madder and tincture of indigo, found them in the urine after fifteen minutes, as also rhubarb and gallic acid after twenty minutes, by means of the colour and by reagents.[†]

If we now compare this rapid passage of medicinal substances into the blood with the tardy course of the lymph and chyle, we will at once see that the former cannot reach the blood in this way.

Another question now is, are medicinal substances, which come in contact with the blood-vessels in the way already mentioned, wholly and entirely absorbed, or can they pass them by, and so escape them, at least in part? One will be inclined to admit the latter, if it can be first supposed that the parts adjoining the blood-vessels are also permeable to medicinal substances. It has been already shown that the epidermis, (epithelium,) serous membranes, the coats of the arteries and veins, are penetrated by medicinal substances, and there are instances to show that such substances applied to the surface penetrate to the deepest muscular layers, and that substances applied to the thorax and abdomen have been found in the neighbouring parts beneath the membrane lining these cavities. This phenomenon being rather important for explaining medicinal action, we shall adduce one or two examples in confirmation of it.[‡]

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[*] Meckel's Archiv. B. 3. H. 4. s. 497.

[†] Tiedemann's &c., Zeitschrift f. Physiol. b. ii. s. 47.

[‡] A young fox into whose stomach Emmert had introduced a saturated solution of sugar of lead, was immediately seized with fatal symptoms. Before life was entirely gone, he found, on examining the abdominal viscera, that the coats of the stomach, and the surface of the

The oldest observations appertaining to this matter are by Theophrastus. According to this observer, strong-scented cataplasms applied to the stomach are soon discovered and detected by the odour which is perceived during the occurrence of eructations.*

In treating a patient for a large carbuncle on the back which had put on a gangrenous appearance, Wedemeyer divided the tumour by a crucial incision, and injected into its several sinuses about two ounces of turpentine; whilst the wound was being tied up, a fit of coughing with faintness suddenly came on, during which the patient's breath exhaled a strong odour of turpentine perceptible even to himself.†

If the resin of jalap in the form of ointment be rubbed into the skin of the abdomen of a dog, Orfila states that diarrhœa and dysentery are occasioned. Whereas if the finely powdered resin be applied to the cellular tissue on the back of an animal of the same species, no other effect is produced save such as would be caused by a simple wound kept open by a foreign body. Now, in the former case, if the action of this substance on the intestinal canal was a consequence of its entrance into the blood, we can see no reason why the same

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liver in contact with it, were so penetrated by the sugar of lead, that they presented a white colour on several parts, and were blackened by admitting a stream of sulphuretted hydrogen over them. (Meckel's Archiv. b. iv. H. 2. s. 203.) See also Journ. de Physiol. p. Magendie, t. iii. p. 39, 40.

* Declarant autem Cataplasmata et quæ malagmata nonnulli vocant, quid valeant, cum tumores et abscessus dissipent, et alia plura vitia emendent, non in summo tantum corpore, verum etiam in interioribus, ut, si quis præcordiis pectorique forte illinat, cum ructu statim odorem reddat unguentorum. Theophrasti Erasii Opera, quæ supersunt omnia. Ed. Schneider. Lips. 1818, t. ii. p. 407.

† Untersuchungen über den Kreislauf des Blutes. Hanover, 1828. s. 447.

thing should not occur in the second mode of application, as it is certain that those substances which pass into the circulation, reach there much more easily from wounds than when they are applied to the unbroken surface. We are, therefore, obliged to admit that the jalap-resin acts by penetrating the abdominal parietes, and so reaching the nerves of the intestinal canal. We are the more warranted in making this admission, as several drastic substances, as colocynth, &c., when applied to the cellular tissue, occasion deep inflammations, extending over an entire limb, a phenomenon which can only be the consequence of these substances penetrating through all the inflamed tissues.

The examples now adduced may serve to account for those remote medicinal actions which are admitted to be occasioned by contiguity of parts; for medicinal substances are frequently applied to the thoracic and abdominal cavities, with the view of acting on the viscera contained within. The action of those substances which produce irritation on the place of application, and thereby an increased afflux of fluids, may be readily accounted for by the vascular connexion existing between the internal and external parts. But why other substances, possessing no such derivative action, should exert their medicinal properties, on the stomach for instance, more powerfully when applied immediately to the external surface lying over it, cannot be explained by nervous conduction, nor by the assumption that the substances so applied pass into the blood. This stronger action cannot be explained by nervous conduction, because the nerves of the abdominal integuments are not in closer sympathy with the gastric nerves than the nerves of the entire surface of the body. But if this action depended on the reception of the medicinal substance into the blood, it could not act more powerfully on the stomach from the integuments of the abdomen, than if it had been applied to any other part of the surface. If, then, a substance, which produces no local irritation, act on parts and organs, lying nearest beneath the place of application, more powerfully than when they are applied in any other way, and even without producing their ordinary remote effects, we must admit that this same substance must have penetrated all the tissues lying between the place of application and the organ in question; otherwise it cannot be explained, for instance, how opium can produce a sedative effect on the stomach from the integuments of the abdomen, without exciting its ordinary narcotic effects. The same view is confirmed by Lembert's experiments concerning the endermic application of medicines. According to him, morphia removes dysuria the more readily the nearer it is applied to the uro-poietic organs; strychnia acts more powerfully when applied nearest to the parts affected; belladonna, when applied to a part of the lower extremities divested of epidermis, affects the brain very imperceptibly, but very violently when the place of application is near this organ.

We must, however, beware of ascribing to the medicinal substance an action which is often dependent only on the form of application. Thus we often apply narcotic and aromatic medicinal substances in the form of warm cataplasms, &c. Now if such be applied to the abdomen, for instance, they may exert a sedative, anti-flatulent action on the intestinal canal, by virtue of their warmth, without the least share in the production of these effects being ascribable to the substances applied. In general, we should never account for the remote effects of medicinal substances in this way, when they can be easily explained by the admission that they pass into the circulation.

How the blood and medicinal substances re-act on each other when they meet.—Having now considered the way in which medicinal substances enter the blood, our next consideration will be, how the blood and medicinal substances mutually affect each other when they meet.

In the first place, whenever a medicinal substance, no matter how administered, is found in the secretions and excretions, or in the solids of the body, retaining all its original properties, we are certainly warranted in concluding that this substance was merely mixed with the blood. Thus those substances which act by virtue of an ethereal oil are discovered by their odour in the secretions and excretions. Others, again, are detected by their taste, as bitters and aromatics. Mineral substances, as nitre, the carbonates of soda and potash, have also been detected by means of their physical and chemical properties.

Though these substances suffer no change in the blood, still the same cannot be said of the blood itself. Regarding these changes, however, little satisfactory is known. Thus it is known that the neutral salts have the property of preventing or retarding the coagulation of the blood. Dr. Stevens has also rendered it probable, by some experiments, that these salts have the property of imparting a brighter and redder colour to this fluid. It is probable that, to this property of diminishing the coagulability of the blood, these salts are indebted for their antiphlogistic effects; though, for producing such effects, they owe something to their property of promoting the secretions.

It is well known that, after the use of bitters, considerable changes are observed to take place in the blood; this, however, is not so much from their action on the constituents of the blood, as from their improving the powers of digestion.

Narcotic medicines are known to render the blood thinner, and to impart to it a dark blue colour, and oftentimes a greasy consistence. So much for medicines which manifest a chemical indifference with respect to the constituents of the blood. The case is different with those substances which, even out of the body, enter into combination with the constituents of the blood; they are found to have the same property during life. This is known to be the case, 1st, with certain simple substances used as medicines, as sulphur and iodine, which, after being administered, are never found in the blood, in the secretions or excretions, unless in combination with some other body, viz. in the form of iodide or sulphuret of potassium. According to Wöhler, it is probable that part of the sulphur is changed into sulphuric acid; for in the urine of a dog, to which lowers of sulphur had been given, he found both sulphuret of potassium and sulphate of potash.*

2nd. Acids, especially the vegetable acids, are always ound, at least in the urine, combined with bases. 3rd. Whenever a preparation of mercury is administered, we are never ble, by means of any re-agent, to detect the metal in the blood, unless the blood itself be entirely decomposed; from which we must conclude that the metal enters into an intimate ombination with some constituent of the blood, probably with lbumen.

Whether medicinal substances are merely mixed with the lood, or whether they undergo changes in it, or whether the lood is changed by them, or whether its constituents enter nto combinations with them, the question still remains o be solved, where and how blood impregnated with medicinal substances, or changed by them, acts on the nervous ystem.

If we consider medicinal actions in general with respect to ocality, they may be divided into those which are recognizable y changed vital phenomena in the functions of the central rgans of the nervous system, and those which are manifested by changes in the functions of the peripheric organs. We are hence inclined to conclude that medicines contained in the blood act, if not exclusively, at least chiefly, on the central organs of the nervous system, and on the peripheric terminations of the nerves. Such a conclusion will only be fully established, if it can be shown that medicinal action from any other parts cannot take place.

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* Versuche über den Uebergang von Materien in den Harn; in Tiedemann's Zeitschr. f. Physiol. B. I. H. 1. s. 130.

If we suppose a medicinal substance circulating in the blood, the first question which forces itself on us is, how does this act on the parietes of the vessels? Considering that medicinal action can take place only where there are nerves, we must conclude, *a priori*, that in the larger trunks, and even in the smaller vessels, no medicinal actions go on, there being no nerves on the inner membrane of these vessels. Medicinal substances which enter the circulation can, therefore, only act there, where all change of substance and all reciprocal action between the solids and fluids take place, namely in the capillary vascular system. But it is only the central parts and the peripheric terminations of the nervous system that are in the most intimate and multiplied contact with the capillary system. It is here that the medicinal substances, circulating with other constituents of the blood, enter from these vessels, and, as it were, irrigate the islets of the solid parts lying between them; and through this contact with the nervous terminations, and, one might say, with the interior of the central organs of the nervous system, medicinal action is called forth. Numerous experiments prove that the blood-vessels have no capability of reaction on the application of medicinal substances,* one of the factors necessary for medicinal action being wanting—we mean the nerve. The experiments of Fontana, Wedemeyer,* Christison, and Macartney, establish the same fact.

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* See Mem. sur les colorations cadavériques des artères et des veines: in Arch. General. de Med., Jan. 1827, p. 321; also Journal de Physiologie. par Magendie, t. v. p. 338.

It still remains for us to show that medicinal substances produce medicinal actions through their contact with the centres of the nervous system, and its terminations alone. That medicines act on the nervous terminations is probably denied by no one; nay, some have even gone so far as to explain all medicinal actions, even those excited in remote organs, from the impression made by medicines on the nervous terminations at the place of application. An action on the nervous endings, however, is in general unconditionally allowed to take place only where the medicinal substance is immediately applied; but it may now be asked, will a medicine circulating in the blood act on the nervous terminations, or confine its influence merely to the central organs of the nervous system, as some admit with respect to narcotic medicines, that they act only on the spinal chord, and thence on the other organs. We will not venture to suppose that all medicines which act on the periphery of the organism, when they come in contact with the nervous endings, will do the same thing, when they meet with them, whilst circulating in the blood; but there are facts which show that medicinal substances taken into the blood excite medicinal actions in contact with the nervous terminations.

Dupuytren injected milk into the veins of a dog, and saw the same movements produced as if it had been applied to his tongue. A strong-scented fluid was injected into the veins of a dog; upon which the animal dilated his nostrils, raised his head, and began to snuff around him in quest of the odorous substance. Hale injected some castor oil into a vein in his own arm, and soon had the taste of the oil in his mouth, which lasted for an hour and half. Various substances, such as camphor, wormwood, aloe, garlick, and hemlock, when applied to various parts of the body, but not taken by the mouth, were all found to produce their respective tastes in the mouth. This phenomenon can only be accounted for by supposing that these substances are absorbed, arrive at the organ of taste when mixed with the blood, and here excite the sense of taste.

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* Physiol. Untersuchungen uber das Nervensystem. Hanover, 1817. S. 234.

Medicines contained in the blood influence in a similar manner the nerves of sensation and motion. Thus acetate of lead and tobacco, when injected into the femoral artery, excite violent pains in the corresponding limb. It may probably be supposed that such pain depends, at least in part, on the action of these substances on the nervous trunks supplied by this artery. Such an objection, however, is met by the fact, that tobacco and acetate of lead excite no pain when they are applied immediately to the femoral nerve, so that we must conclude the substances injected into the artery act on the parts of the nerve, where they are formed into organs of sensation.

That the terminations of the nerves of motion are affected by substances circulating in the blood, is also proved by experiment.*

In the case of narcotic substances, it is very easy to show that their action is on the nervous terminations. We know that these substances, when applied locally, produce effects only on the place of application, without affecting either the brain or chord. The experiments of Wilson Philip,* of Munro,† and of Coullon,‡ sufficiently prove this.

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* If the spirituous extract of nux vomica be injected into the femoral artery, the corresponding thigh becomes the seat of immediate contractions, and after a little time, whether the spinal chord be divided or not, general tetanus takes place. Here the exerted movements of the thigh cannot be ascribed to the action of this substance on the nervous trunks of the limb, as it is well known that strychnine immediately applied to the nervous trunk produces no effect, and accordingly no motion in the muscles, which are supplied with nervous twigs from this trunk. The contractions of the thigh are therefore solely the consequence of the action of the nux vomica on the nervous terminations of the affected muscles.

The most striking proof that narcotics are capable of exciting local effects, which depend not on their previous action on the central parts of the nervous system, is derived from the method of applying medicinal substances to the skin deprived of the epidermis.

From all that has been said, it cannot be denied that there are medicinal actions which can only be accounted for by the action of the medicinal substance so circulating in the blood on the nervous terminations. These we may call peripheric medicinal actions. It now remains for us to show that medicinal substances taken into the blood act in like manner on the central parts of the nervous system.

If there be medicinal substances whose effects depend entirely, or in part, on their immediate action on the central organs of the nervous system, they must produce such effect so much the more powerfully and rapidly, the nearer the place where they are introduced into the blood is to these parts. This opinion is confirmed by experiment. Opium kills much sooner when injected into the carotid, than into any other blood-vessel. The same thing may be proved of all substances whose effects are recognizable by the change they produce in the vital activity of the brain. Orfila states that this is the case with all narcotics.

From what has been said, it may be inferred that a medicinal substance which has passed into the circulation acts only by exerting its influence partly on the central portions of the nervous system, and partly on the nervous terminations, and that there is no medicinal action which may not be accounted for in this way. Every medicinal action is accordingly the consequence either of the reciprocal action between the medicine, and the brain, and spinal marrow, or the nervous terminations (the peripheric organs.) Therefore, wherever we observe in a part or organ a structural or functional change on the application of a medicinal substance, we shall be warranted in ascribing this generally to the local action of this substance, unless it can be explained by the laws of sympathy. We say generally, for there are medicinal actions of which it can scarcely be distinguished whether they are a consequence of the action of the substance on the central parts of the nervous system, or on certain nervous endings. Thus, with respect to nux vomica, it is admitted that it acts chiefly on the spinal chord, and thereby occasions contractions in the lower extremities. But that a medicinal substance can produce morbid movements in the extremities from the spinal chord, without this first acting on the nervous terminations, has been proved by repeated experiments. For if a substance which excites contractions be applied to an animal after tying the artery leading to an extremity, such contractions take place in that part to which no blood impregnated with the medicinal substance can come.* Here the contractions are manifestly excited in the extremity in which the artery is tied only mediately from the spinal marrow. But it has been repeatedly stated that such substances as prussic acid and strychnine, &c., excite contractions in parts whose nervous connexion with the spinal chord was cut off, when those substances were applied immediately to these parts. Backer saw rigid spasm and paralysis occasioned after the application of strychnine and false angustura, and that these phenomena continued even after dividing the spinal chord in the parts situate beneath the division.* We must therefore suppose, that when a substance which excites morbid movements in a part, can effect such movements from the spinal chord, and can also produce them through immediate action on the nervous terminations of the affected organ, it is not improbable that both the spinal chord and the nervous termination have a share in producing such effect. In general, wherever a medicine excites unusual movements, it will be, in most cases, difficult to distinguish whether these are to be ascribed to the action of the substance on the brain and spinal chord, or on the nervous terminations appertaining to the affected organ. This is the case with all narcotic substances which excite cramps and contractions, &c., as well as with digitalis and tobacco, when they diminish the contractions of the heart. Still a distinction is possible in some rare cases, as, for instance, in the case of oxalic acid. If this be given diluted in a considerable dose, a leading symptom produced by it is paralysis of the heart. After death, blood is found in the left cavities of this viscus, and the heart itself has lost all capability of contraction, which is the case with no other muscle of the body. Must not then the paralysis of this organ be ascribed to the immediate action of the acid on the nerves of the heart?

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* Experiments on opium, 1795. See also Christison.

† Edinb. Phys. and Lit. Essays, t. iii. p. 311.

‡ Recherches sur l'acide hydrocyanique, 1819, p. 179.

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* See Lund's Vivisectionem, p. 109.

We have now seen that all medicinal substances which act not till after their reception into the blood, produce their effects only by coming in contact with the central parts of the nervous system, or the terminal extremities of the nerves of the various organs; still we are not able to explain by this means one of the most important properties of medicinal actions, namely, the property which several substances have of acting only on particular organs. Though there are entire classes of medicines which influence all the organs with tolerable uniformity, still, on the other hand, it is not to be denied that the most important medicinal substances exert, if not their exclusive, at least their principal action on certain individual organs. Thus nux vomica exerts its chief action on the spinal chord, opium principally affects the brain, digitalis and tobacco the heart, cantharides the genital and urinary organs; in short, the most important medicinal substances act specifically on certain individual organs.

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* Commentatio ad quæst. physiol. Traject. ad Rhen., 1830.

Repeated experiments have proved that medicines which in the ordinary mode of application affect only certain organs, do the same thing when they are introduced immediately into the blood.

Thus opium, when it is infused into the blood, produces sleep and stupor just as when it is swallowed; tartar emetic produces vomiting; arsenic, gastric inflammation, with other phenomena; cantharides stimulates the urinary and genital organs, &c. These examples are sufficient to show that a substance introduced immediately into the blood must not necessarily act with the same power on all organs with whose nerves it comes in contact, but that it may affect only certain individual organs in particular. Now, if such a preference for particular organs is proved to exist in medicinal substances immediately introduced into the blood, the same must hold good when these reach the blood through the medium of absorption. The fact then requires no further proof that a medicine taken into the blood may exert its power, if not exclusively, at least in a higher degree, on particular organs.

The assumption that particular organs possess a specific susceptibility for certain medicinal substances, is supported by the following facts:

1. *Particular medicines occasion an increased afflux of blood o the organs on which they chiefly exert their influence, and ven excite in them structural changes.*

Thus opium, according to the experiments of Flourens, acts principally on the great lobes of the brain; an inference leduced from the observation, that, after poisoning with opium, hose parts are always the seat of sanguineous effusion, the ther parts of the brain being entirely unchanged. According to he same experimenter, the watery extract of belladonna, in certain dose, acts on no other parts of the brain except the ubercula quadrigemina; accordingly it only affects the sense f vision over which these tubercles are supposed to preside. Such observations would seem to indicate a species of attractive ower or of elective affinity between the affected organ and he medicinal substance, by virtue of which either the blood mpregnated with this substance flows to it in greater quantity, r, what is more likely, after its afflux to it, it is detained here.

2. *Medicines which act on particular organs are occasionally eposited in them.*

Thus, arsenic, which exerts its action on the spinal chord, as been found in this part in cases of poisoning by it.

3. *Medicines which promote certain secretions are excreted ith them.*

This phenomenon can only be accounted for by the admission, that the nerves of certain organs stand in peculiar relation o certain medicinal substances.

The truth of this proposition has been already proved in reference to diuretic medicines by Wöhler.* The medicinal substances principally found in the urine are those possessed of iuretic powers; such as the vegetable acids, the various diureic salts, squills, garlick, oil of turpentine, &c. If diuretic medicines promote other secretions also, they may be found in them.

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* Vid. loc. supra cit.

All volatile medicines are excreted through the pulmonary transpiration, and with extreme rapidity; thus, in the case of a dog to which prussic acid had been given through a wound in the thigh, the acid was observable in the expired air after one minute. Ethereal oil, spirit of wine, camphor, in whatever way they are administered, can be readily detected in the pulmonary transpiration after three or four minutes. If these substances be immediately injected into the blood, they pass instantaneously into the pulmonary transpiration, and such of them as are stimulating generally excite pulmonic inflammation, as has been proved by Tiedemann.*

Generally speaking, these substances have great influence over the function of the lungs. All volatile stimulants accelerate the respiration, and hence it may be supposed that they are not devoid of influence in effecting a change in the venous blood. Those substances are frequently employed as expectorants in torpid states of the pulmonary organs, especially in aged persons. Prussic acid produces an opposite effect; for in large doses it impedes the respiration very much, and it is possible that the disturbance of this function has no unimportant share in the change of the blood found in those poisoned with this acid. This view is probably borne out by the circumstance, that persons poisoned with prussic acid have been saved by keeping up the respiration artificially.†

All substances which increase the cutaneous transpiration are generally excreted with it. This happens with medicines which are indebted for their diaphoretic action to an ethereal oil, and also with sulphur and opium.

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* Zeitschrift, f. Physiologie, B. 5, H. 2. s. 203.

† It is, perhaps, more probable that the artificial keeping up the respiration in cases of prussic acid is beneficial for this reason, because with every expiration prussic acid is removed from the body.

From these facts we are warranted in concluding, that certain organs possess a specific susceptibility for the action of certain medicines. We shall now see that there are other vital phenomena and vital processes which are very similar to this specific medicinal action on particular organs. As an instance of such vital process, we may instance:

1st. The process of nutrition. It is certain that the proximate principles of the organs partly exist already in the blood; such as the fibrine, albumen, &c. These several substances, in contributing to nutrition, are not deposited accidentally here and there, but they are attracted by similar organic parts; thus fibrine is attracted by the muscles, albumen by the glands, &c. There is then, during the process of nutrition, a species of elective attraction between certain organs and certain substances contained in the blood, which bears at least some resemblance to the process that takes place when certain medicinal substances are deposited only in those organs on which they are destined more immediately to act.

2nd. The secretions. With respect to the secretions, also, it has been proved that many of them are already present in the blood. Now we know that these are usually eliminated from the body, each by some particular secreting organ; a fact which can only be explained by admitting that these secretions already formed in the blood are more especially attracted by certain organs. Among the secretions which possess peculiar constituents may be reckoned the urine. In the healthy state, urea and uric acid are found in it. Now with respect to the urea, it has been shown by Prevost and Dumas that it exists already formed in the blood, and that it is not in the kidneys merely it is formed. With respect to this substance, it must now be admitted that it is eliminated by the kidneys, solely for this reason, because between both there exists a species of elective attraction. As a further proof of such attraction, it has been ascertained to possess diuretic properties, whether taken internally, or injected into the veins. Vauquelin and Segalas,* Fouquier † and Laennec,‡ have given it accordingly as a medicine. It is well known that the Arabians used the urine of the sheep and of the ass as a diuretic.

That the specific and exclusive action of certain medicinal substances on certain organs may be accounted for by a peculiar susceptibility of the one for the other, is further illustrated by,

3rd. The impressibility or sensibility of certain nerves and certain organs to other stimuli not medicinal. Thus we know that it is only in the nerves proved by Charles Bell to be destined for sensation, that the sense of pain can be produced. Magendie states that mechanical irritation of the optic nerves or of the olfactory nerves occasions no feeling of pain. Panizza proved the same thing respecting the hypoglossal nerve, the division of which occasioned no pain, but merely loss of motion in the tongue, whilst the division of the lingual nerve of the fifth pair occasioned the most violent pain.§

But the most remarkable relation is found to exist between the organs of sense and their nerves, and external stimuli. Each of these nerves, it is well known, has real sensibility only for certain stimuli. Thus light and colour are the natural stimuli of the organ of vision, and no other sense is affected by them; sound stimulates the ear, and not the eye; sugar makes no impression on the organ of smell, and he who posesses not this latter sense may bathe in rose oil, without experiencing the least odour.

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* Journal de Physiol., par Magendie, t. 11, p. 354.

† Geiger's Magazin. b. ii. s. 301.

‡ Froriep's Notizen, b. 13. s. 80.

§ Ricerche sperimentale sopra i Nervi. Lettera del Prof. B. Panizza al Prof. M. Bufalini. Pavia, 1834.

If, then, we can understand that a particle of an odour does not affect the eye, and that the organ of smell is insensible to light, we may easily conceive how it happens that a medicinal substance circulating in the blood, though it come in contact with all the organs, affects only some particular organ.

All these phenomena are accounted for by considering that every organ with its nerves forms a more or less independent whole, possessing its own peculiar vitality and formation. All the organs must therefore manifest a different sensibility or impressibility towards external or relatively external stimuli, according to its peculiar endowment. This is illustrated in the process of nutrition, and in the several secretions, as well as in the functions of the organs of sense, and the case is precisely the same with respect to substances circulating in the blood which produce different effects in different organs.

CHAPTER VI.

Surfaces adapted for the application of medicinal substances ten in number—1. Stomach and small intestines—2. Large intestines—3. Skin—4. Surface of the eyes—5. Pituitary membrane—6. Interior of the mouth—7. Surface of the air-tubes—8. Interior of the meatus auditorius—9. Urethra and bladder—10. Vagina and uterus—Advantages of the gastro-intestinal surface for the application of medicines, whence—Necessity of attending to the state of the stomach in administering medicines—and also of the large intestines—Great importance of the skin as a surface of medicinal application—Of the absorption of medicines—Action of medicines by sympathy—Action by contiguity—By revulsion—Power of habit on the action of medicines.

Medicines produce their ordinary effects on the living body only when they are brought into immediate contact with some of its parts. Every physiological or therapeutical effect arising from the employment of a medicinal substance always supposes a material, actual contact of the latter with some part of the animal on which it first exerts its action, and from whence it extends its influence to distant parts.

When studying the action of pharmaceutical substances on the animal economy, it becomes necessary to consider the various parts of the body to which it is usual to apply them. In the first place, the surfaces fitted for receiving medicinal substances are always covered either by skin, or by a mucous membrane. But when we review successively the several parts and divisions of these two structures, the one of which covers the nimal machine externally, whilst the other lines all the cavi-ies which communicate with the exterior, we find beneath them onditions of organization extremely diversified. In one part e find exquisite sensibility, whilst in a part not far distant his same property is very slight. The function of absorption oes not go on with equal activity in every part. The sympa-hetic communications are neither as numerous nor as important n several parts of the body as in others. The proximity of iscera essential to life gives to some parts of the body indispu-able advantages over others for medicinal application. Others, gain, are recommended by the presence of excretory ducts hich terminate on them, because, by acting on the extremity f these ducts, the influence of the medicine is felt by the rgans to which such ducts belong.

The parts or surfaces adapted for the application of medici-al substances are ten in number:* viz. 1. the stomach and ntestines; 2. the large intestines alone; 3. the skin; 4. the urface of the eyes; 5. the pituitary membrane; 6. the interior f the mouth; 7. the surface of the air-tubes; 8. the interior f the meatus auditorius; the interior of the urethra and ladder; 10. in the female, the vagina, and sometimes the avity of the uterus.

Of the stomach and intestines.—All these parts are not qually advantageous for the application of medicines. There re some, as the gastro-intestinal surface, where medicines find xtraordinary facility for the developement of their active owers. In the first place, we may introduce into the primæ iæ, without any apprehension of danger, a sufficient quantity f a medicinal substance for its action to have all the desired nergy. In the next place, the gastro-intestinal surface is overed with numerous inhaling pores, ready to absorb the medicinal molecules. Moreover, the sensibility of this part is truly exquisite, and the great quantity of branches which the digestive organs receive from the pneumo-gastric and trisplanchnic nerves, favour the transmission, by sympathy, of the medicinal operation primarily and immediately made on them to all the parts of the body. The stomach, closely and intimately connected as it is to the brain, spinal chord, heart, and lungs, seems to render the impressions made on it by pharmaceutical agents common to all these organs. The nervous plexus by which this viscus is enveloped communicates with all the other plexuses, and, by its position, concurs in forming the principal centre of the system of the ganglionic nerves ; this centre occupies the epigastrium, and to it must be referred the sensations experienced in this region.* The advantages presented by the

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* Barbier, Mat. Med.

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* In the operation of medicines, the part which the system of innervation performs has never been sufficiently appreciated. Everything exclusive of the absorption of its molecules in the action of a medicine, appertains to the impressions made by it directly or by sympathy on the plexuses of the ganglionic nerves, the nervous chords, the spinal marrow, and the medulla oblongata.

When a medicinal substance traverses the interior of the primæ viæ, it is less on the organic fibres which constitute the tissues of the stomach and intestines that it acts, than on the nervous expansions with which it comes in contact. 1. In the stomach, the divisions of the pneumo-gastric nerve transmit its action to the medulla oblongata: this action may produce some change in the state of the latter, and impart to it a new power, and an unusual force of innervation. 2. On the intestinal surface the medicine will come in contact with nerves communicating with the spinal chord. The modifications produced in these nerves will soon become common to the spinal chord, which will take on another mode of action, and give rise to perceptible changes over all the the parts of the animal system. 3. Every medicine on coming into the stomach touches the irradiations of the solar plexus, which will of course undergo some modification, and accordingly its influence will assume an altered character. The impression so made on the solar plexus extends to all the plexuses of the ganglionic nerves. The entire system of innervation, in consequence of the impressions of a medicine, thus acquires an acciastro-intestinal surface for the application of medicines are well known and appreciated, that most of our pharmaceu-ical agents are destined for it; their dose is proportioned to its onvenience, and it is it we always have in view when we speak f the employment of a medicinal substance.

The importance of the stomach is long since recognized in hysiology; with respect to pathology, its importance is still reater. This viscus is affected in almost all diseases, and there re few organs which pass more readily into a morbid state. Hence it becomes necessary for the practitioner carefully to onsider the state of this organ when he is about to prescribe edicines, as the pathological condition in which it may be, ill modify very much their action and their effects. The tomach may be in a state of irritation, of inflammation, or of lceration. It is scarcely necessary to point out the serious onsequences which, under such circumstances, may result from he indiscreet employment of active, irritating substances, hich seldom fail to exasperate the morbid condition of the

ental or new activity, which is diffused over the entire animal eco-omy.

Thus we see the importance which should be attached to the operation medicinal substances on the nervous plexuses, the spinal marrow, and e medulla oblongata. In conclusion, it may be well to remark, that r the application of certain medicines, there is a vast difference between surface which corresponds with the medulla oblongata, and a surface hich has its communications confined to the spinal chord; thus tartar netic in the dose of one or two grains usually produces vomiting, when ven by the mouth: whilst, if given in the form of lavement, in the dose f six, eight, or ten grains, it no longer vomits; or if it do, it is not till x or more hours after the introduction of the substance by the anus, d the effect is then produced by absorption. The reason is this: in e stomach it comes in contact with the divisions of the pneumo-gastric rve, which transmits the impression to the medulla oblongata; such nnexion does not exist for the intestinal surface.

organ, and to excite sympathetic irritations in distant parts. In some cases the stomach and intestines become, as it were, centres of perceptions; whatever offends or irritates them offends and irritates the entire system. The impressions made on them are quickly felt by all the other parts; and whatever affects the digestive system affects the cerebral organ, as also the organs of circulation, &c. These considerations are of the utmost importance in the practice of medicine; they should teach more caution than is usually observed in the employment of drastic purgatives, which are known to be the sheet anchor of the ignorant pretender, and barefaced empiric.

If the stomach, when morbidly affected, imposes on the practitioner the necessity of the greatest reserve in the use of acrid medicinal substances, matters are different when this organ is healthy; it can then receive the strongest impressions without its physiological condition being at all impaired, or if it be, it soon recovers.

Large intestines.—The surface of the large intestines presents conditions far less favourable for the administration of medicines, than that of the stomach or small intestines. Yet on the surfaces of the cœcum, colon, and rectum, there are several nervous filaments, connected with the great sympathetic, and forming part of the ganglionic plexuses. By these nerves this surface is connected more or less with the brain and spinal chord; the impressions made on it are quickly propagated to the heart, lungs, and other important organs. The inner surface of the large intestines is also the seat of a very active absorption, and the molecules of medicinal substances introduced into this cavity soon make their way into the torrent of the circulation. In consequence of the large intestines not enjoying that delicate sensibility with which the stomach is endowed, double or treble the ordinary doses of acrid and irritating substances may be introduced in the form of enema.*

The physician very often establishes revulsive points of irritation, which are found to be very effectual in affections of the head, chest, and other parts. Before, however, we introduce medicinal substances into the large intestine, we should carefully examine the state in which it is; inasmuch as if it be the seat of inflammatory action, the introduction of acrid, stimulating substances would prove seriously detrimental, by exasperating the morbid state already existing. In selecting the surface of the large intestines for the application of medicinal substances, the practitioner is enabled to spare the cavity of the stomach; and this cavity being so very frequently in a morbid state, it often becomes extremely advantageous to find some other part for the application of medicinal agents.

The skin.—Medicinal substances are sometimes applied to the skin. In such cases it becomes necessary to consider the part to which they are to be applied, as well as the organs which lie beneath such part, in order to judge of the extent and importance of the effects to be produced. It should also be borne in mind that the skin in the human subject receives a great number of nervous filaments, whereby it is endowed with an exquisite sensibility. Beneath the epidermis, which lines the skin, there is found a very dense network of capillaries, which become injected with blood under the stimulating influence of a great number of causes, by which means the vitality of the dermoid system becomes very much increased. A constant process of absorption is going on throughout the surface of this organ; it is moreover connected sympathetically with all parts of the body; whence it is easy to see that in this way medicinal substances may excite in the system organic changes of considerable importance.

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* We have already seen that opiate enemata form an exception to this.

The process of cutaneous absorption, however, presents great anomalies. In some cases the molecules of medicinal substances penetrate rapidly in this way, whilst in others they enter but slowly into the inhaling pores of the skin. Absorption, often languid, and sometimes entirely absent, whilst the epidermis is sound, whole, and thick, becomes extremely active as soon as this same structure becomes changed, attenuated, divided, or removed. This function of absorption becomes very rapid and intense when the epidermis is entirely taken away. Then the entire medicinal substance seems to insinuate itself into the body, and to subject the entire system to its influence. But as long as the epidermis retains its normal state, there exists great uncertainty with respect to the introduction of the medicinal agent into the blood, and, above all, with respect to the quantity introduced; a circumstance which considerably modifies the advantages which might otherwise be derived from this mode of employing remedies.

It cannot be doubted but that the application of medicinal substances to the skin has been productive of very favourable results. It is, however, when the stomach is in a morbid state, and when it rejects pharmaceutical agents, that the physician avails himself of this means of introducing the molecules of medicinal substances.

The other surfaces, to which medicinal agents may be applied, do not present sufficient interest here to warrant us in dwelling on them, and in general the effects to be produced by application to them are merely local. We shall now proceed to consider

HOW MEDICINAL SUBSTANCES ACT ON THE LIVING BODY.

Clinical observation and physiological experiments prove hat medicines act on the living body:—1st, by a direct imression on the organs which receive them; 2nd, by their eing absorbed into the circulating mass; 3rd, by sympathy; 4th, by contiguity; and 5th, by revulsion.

1. *By a direct impression on the organ receiving them.*—This is the simplest mode in which medicinal substances can e conceived to act. When these substances and a living surace are placed in immediate contact, the medicinal substance rdinarily produces some change in the physical state or vital ondition of the receiving surface; an impression is made on he fibres of the organs, by which variations and modifications re produced in the actual condition of the latter. It is probably n this way that tonics and stimulants act, when they are given r the purpose of strengthening the digestive organs. When aken into the stomach, the medicinal principles of these subances exercise a constringing influence on the fibres of the rgan, and, by thus imparting strength and tone to its coats, nable it to perform its functions with more ease and freedom. ollyria applied to the eye, injections into the rectum, rethra, &c., may be supposed to act in a somewhat similar ay.

2. *By absorption of their molecules.*—We have already condered the effects of medicinal substances which are absorbed nto the system, as well as the various arguments derivable om experiment in favour of this view of the action of medines. The experiments of several physiologists have proved at medicines derived from the mineral kingdom are more fractory to the assimilating powers of the digestive organs, an either animal or vegetable substances. The experiments Tiedemann and Gmelin go far to show that mineral sub-

stances are entirely exempt from the action of the digestive organs, and that they are either expelled from the system with the fæces, or absorbed with the utmost facility and certainty.

The energy of absorption varies according to the organ to which application is made, and according as the organic functions have become more or less active during disease. Thus in certain nervous affections, as tetanus, the assimilating power of the stomach appears to be so much increased, that this organ is able to digest enormous quantities of opium, and so completely to change the nature of this substance, as to prevent its narcotic powers from being perceived. When, on the contrary, this drug is injected into the veins in much smaller doses, it produces its ordinary effects during the same disease. We have already seen that laudanum injected into the rectum exerts a much more narcotic power than when taken by the mouth.

In reviewing the various surfaces to which medicinal substances may be applied, several considerations naturally suggest themselves:—1. It is necessary that there be an intimate contact between the medicine and the surface to which it is applied; there must be a sort of imbibition of the medicinal substance into the tissue of the part, in order that absorption should go on actively. 2. The absorbents do not act with the same avidity on all surfaces; in some parts they evince great activity, as in the air-cells of the lungs, and on the gastro-intestinal mucous membrane; but when the absorbing faculty is traced on other surfaces, as on the skin for instance, it is found to be very languid and inert; thus we see the practitioner should take into consideration the anatomical condition and physiological power of that part of the body to which he intends to apply his medicine. 3. The surfaces selected for the application of medicines may be in a morbid state; and this will evidently influence its absorbing power.

4. The contact of the medicinal substance may be painful to the organ which receives it, a circumstance which may cause its expulsion; then if, after swallowing a medicine, vomiting should occur, its particles cannot of course be absorbed. When the arrival of a medicine in the intestines excites muscular contractions of these organs, it is made to pass with great rapidity, is thus expelled the system, and so almost entirely escapes the action of the absorbents. 5. Particular states of the system may also influence the absorbing faculty; thus Magendie has proved that a plethoric state of the system may retard the function of absorption: this fact is well worthy the consideration of the practitioner; as it must show him that he can calculate little on the physiological effects, which depend on the absorption of a medicine, when administered to a patient with a full, strong, and free pulse; he will then see that in order to re-establish the functions of absorption, all that is necessary is to reduce the vascular system by blood-letting. All these considerations are important to the practitioner in those very frequent cases wherein the advantages which he expects from a medicinal substance depend on its reception into the torrent of the circulation.

3. *By sympathy.*—Medicines do not derive all their power over the animal economy from the absorption of their particles; some of their effects depend on another cause. We have just seen that it was the arteries which diffused the medicinal particles over the entire system, and thereby subjected all the parts of the body to their action. On some occasions, however, the nerves appear to conduct the influence of medicinal substances to the most distant organs. This mode of medicinal action, though unknown as to its mechanism, is nevertheless well ascertained; we often see a medicine influence all the vital functions immediately after its arrival in the stomach. Medicines acting by sympathy make an impression on the nerves

of the surface which receives them. Let a spoonful of a mixture containing opium be given to a patient; the first change produced is in the state of the stomach; a new condition is imparted to the nerves of this organ, which is immediately communicated to the brain, spinal chord, and to the entire system of the ganglionic nerves. We then see those spasmodic symptoms, which had their seat in distant organs, entirely cease. The medicine attacks the surface which first receives it; this attack seems to call forth the play of sympathies; it is from this part that the medicinal power sets out. so as to extend to the other parts of the animal economy. Thus when we give ipecacuanha, squill, &c., in order to obtain an expectorant effect, these substances first stimulate the stomach, then by sympathy their stimulant action is transmitted to the pulmonary organs, and thus their expulsive powers are called into action.

Some medicines seem to derive their medicinal powers from a double source: they first excite a series of organic effects, which obviously proceed from sympathy; we then observe another series of phenomena, which are evidently to be ascribed to the absorption of their molecules. Immediately after the internal use of alcohol, the vital powers are raised throughout the entire system; this instantaneous effect is occasioned by the excitation which, originating in the stomach, has affected the entire cerebro-spinal system, and has extended at once to all parts of the body by the medium of the nerves; then, in some time after, other effects are observed, which are attributable to the absorption of the alcohol, and to its impression on the various tissues.

It is in the apparatus of innervation we must always seek the medium through which the medicinal power of substances is transmitted by sympathy. All the new or unusual impressions made on the various organs, meet in them nervous filanents which communicate with the brain, spinal chord, and vith the nervous plexuses of the great sympathetic; the numerous connexions which unite these three centres of the ipparatus of innervation, promptly transmit these various mpressions from one part of the body to all the rest. These onnexions sufficiently account for the propagation and transnission of the virtues of medicinal substances, and show us by vhat mechanism it is that a medicinal action, which seems conined to one single point, is diffused over the entire system.

As we have already remarked, the sympathetic effects of nedicines are proportioned to the intensity of the local action xcited by them. They are observed immediately when this ction commences, increase and terminate with it, whether the nedicinal substance be changed in its nature, or be expelled from the system by the movements which it occasions. The ympathies called into action by medicines are almost always lective; that is, they are directed towards one organ, or some ne system of organs in particular, whose action they call forth r modify. Their effects vary, on the one hand, according to the rgan which excites them; and on the other, according to the ature of the impression made on this organ by the medicinal ubstance. Thus, for instance, administer wine, opium, camhor, squill, kermes mineral, digitalis, by the stomach, these ubstances will produce special sympathetic effects on the ervous system, on the urinary organs, on the internal surface of he air-tubes, and on the heart. Thus we see that the impresions made on the same organ by different medicinal subtances are capable of being transmitted towards some organs rather than towards others.

When the advantage expected from a medicine depends on its ction by sympathy, it is important,—1st, to consider the extent of the impression made by this agent on the part of the body which receives it: 2nd, to study the relations and connexions subsisting between this part and the principal organs. All the surfaces to which medicines are applied are not equally fit to become foci from whence sympathetic actions may radiate; they have not all an equal power to convey to other parts the impressions made on them. We should carefully examine the actual state of the surface which we may select. When the sensibility of the gastric surface is enfeebled, or considerably impaired, the sympathetic effects of medicinal agents appear less marked, and are produced with more difficulty. If, on the other hand, this surface is more sensible than natural, and in a state of irritation, the sympathetic effects of medicines are more prompt and more intense. If the physiological effects produced by camphor, digitalis, &c., be closely observed, we see that one third or one fourth of the ordinary dose will produce vertigo and other strongly marked effects, when the surface to which they are applied happens to be in a state of inflammation. On the contrary, poisons no longer act with their wonted or natural activity when the sensibility of the stomach is impaired or destroyed. Large doses of extract of nux vomica have been given with impunity to animals in which the pneumo-gastric nerves had been tied or divided. M. Dupuy, after dividing the eight pair of nerves in a horse, administered to the animal two ounces of nux vomica without any effect. The same quantity killed another horse in a few hours, in which this operation had not been performed.

By contiguity of organs.—When a medicinal substance is applied to a part of the body, it does not confine its action to the surface, but extends its influence through the subjacent tissues, and thereby reaches the organs placed at some depth. It then seems to propagate its action by a sort of radiation. The morbid state of certain organs is often considerably improved y thus taking advantage of their contiguity to the surface. It s with this view that epithems, consisting of tonic, stimulating, emollient, and sedative substances, are applied over the epigastric and hepatic regions, over the region of the bladder and other organs. The object of the practitioner, under these circumstances, is to make the medicinal virtue of the substance so applied penetrate from without inwards, from the external surface in which the medicinal substance is placed, to the affected organ whose morbid state we desire to correct. It is also by this mode of action that cataplasms are rendered useful when applied to inflammatory swellings, as also ointments and plasters when applied to glandular enlargements. The virtues of these topical applications are supposed to penetrate through the subsequent tissues, so as to reach the parts affected.

Continuity of tissues is also frequently taken advantage of in medical practice. Thus, by stimulating some one point of a mucous membrane, an excitation is produced which is propagated to the entire surface of the organ; irritation of the rectum by suppositories or enemata often suffices to produce a copious secretion and frequent contractions in the upper portions of the intestinal tube.

By revulsion.—When a medicinal substance applied to any part of the body irritates that part, it determines an afflux of blood to it, and thereby a proportional diminution in the quantity of that fluid contained in the vessels of some other part. Thus, we avail ourselves of the principle of revulsion, when we dissipate a rheumatic pain by a sinapism, a dropsy by establishing a copious secretion of sweat and urine, an ophthalmia by applying a blister. Most of those medicinal substances which produce stimulating effects, as drastic purgatives, diaphoretics, diuretics, &c., are employed as revulsives.

This method of treatment is of great use in the practice of medicine; after the direct antiphlogistic treatment, it is the most effectual in combating those affections included under the head of irritations. The theory of revulsion is founded on the law, *duobus doloribus simul existentibus, vehementior obscurat alterum.* The occasions where revulsions are indicated, the precautions to be observed in their employment, &c., shall be fully considered in another place.

On the power of habit over the action of medicines.—If the same medicinal substance be applied daily without interruption to the same part of the body, it is observed to lose its influence gradually, and to fail in affecting parts on which it had previously produced the most striking effects. The inactivity of the medicinal substance is, however, only apparent in such cases, for it has undergone no change whatever; it still retains its physical and chemical qualities, and all its properties; whatever change has occurred, must obviously be in the vital state of the tissues, and in the sensibility of the parts to which medicine is applied. This phenomenon, curious as it is for the physiologist, possesses still greater importance in a therapeutical point of view. The practical physician is taught by it, that he should progressively augment the dose of those medicines whose use he intends to continue for some time, if he wish them to retain the same uniformity and extent of action. This physiological fact, also, shows him that it is prudent to suspend from time to time the employment of these medicinal substances, in the use of which he may intend to persevere for a considerable length of time, lest the different organs may, from the power of habit, become insensible to their impression. It is well known that the power of habit is very great in impairing or destroying the activity of the most dangerous poisons.

It may be well to consider the influence of habit: 1st, on the surfaces which immediately receive medicinal substances; 2nd, on the various tissues of the body to which their molecules are conveyed by absorption, and in which they are deposited; and

rd, on the effects arising from the play of sympathies. With
espect to the first, we every day see instances wherein the
urfaces of the stomach, of the intestines, of the eye, &c., soon
ecome insensible to the contact of medicinal preparations which
re daily applied to them ; such preparations gradually lose
heir influence, and ultimately cease to exercise any power over
arts on which at first they made the most striking impression.
t may be remarked, that one surface may cease to feel the
ffect of a medicinal substance, without such substance losing
s power over other surfaces. Nor have our organs the same
acility in destroying the active power of all medicaments ;
ubstances possessed of irritating properties retain their activity
or a longer time, whilst narcotics yield much sooner.

When a surface has become insensible to the action of a
edicament, its absorbents may still retain their normal activity.
hilst this medicinal agent is, as it were, inert on the part to
hich it is immediately applied, its molecules are conveyed into
e circulation ; and though it may make no impression on the
rface which receives it, it still excites in the movements of
her organs, and in the exercise of the various vital func-
ons, changes which sufficiently prove that it still possesses
ower.

This independence of the general on the local action, with
spect to the power of habit, no longer holds good for those
fects arising from sympathy, because these effects originate
d take their rise in the part to which the medicine is imme-
ately applied. When the sentient extremities of the nerves
hich ramify over a surface are no longer affected by the pre-
nce of a medicament, the nervous communications which
nsmitted the virtues of the latter are now cut off, and ac-
rdingly those sympathetic movements are no longer excited
ich such substance was wont to produce.

CHAPTER VII.

EFFECTS OF MEDICINAL SUBSTANCES.

Effects of medicines—Primary and secondary—Primary, what—Secondary, what—How distinguished.

The action of a medicinal substance on the body gives rise to a series of changes, or phenomena, which have been designated by the common term of the *effects of medicines.* This term, in the very extended sense in which it has been used, embraces different results, which appear only in succession, have not the same origin, and are often derived the one from the other. 1st, The change of state, or modifications effected in the organic tissues by the impression of the medicament administered; 2nd, the new rhythm given to the movements of these tissues. and to the mode in which the functions of the organs formed by these tissues are now performed; 3rd, the beneficial result produced in the state of the patient by the employment of the medicine. These three things, obviously distinct, are always expressed by one and the same term; they are always called the *effects*, or *virtues*, of the medicines. When these terms are used, they are sometimes intended to denote certain secret changes which the solids or fluids of the body are made to undergo; sometimes they signify the evacuations occasioned by the medicine, and sometimes the improvements obtained in the treatment of the morbid state of the patient. Such imperfections in pharmacological language cannot fail to injure the

cience of medicinal action. If persons neglect so frequently to
ote the changes and modifications produced by medicaments
n the state of the various tissues and organs, as well as in the
erformance of their various functions, it is because they con-
ider only as effects the advantages or improvements produced
n the treatment of disease.

The action of a medicinal substance, taken in the proper
ose, may be distinguished into two periods, or divided into
wo parts. 1st, Its contact with the organs of the body calls
rth the developement of its active power; the latter is in-
tantaneously put forth, and certain changes in the state of the
urface to which it is applied denote its power. In a little
ime—whether the molecules of the medicinal substance enter
nto the circulation, and are thus distributed over the system
y the blood, or whether sympathetic communications trans-
it to other parts the impression first made on this surface—
ertain general effects are observed to supervene; the several
rganic tissues no longer continue in the same state, the several
ital acts follow a different rhythm, all the organs take on
nother order of movements. These changes, occasioned by
e direct impression of the medicament on the living parts of
e body, constitute the first period of its action, and may be
lled its *immediate* or *physiological effects*. 2nd. Those
hanges in the actual state of the organs, those modifications
their movements, the new direction given to their vital
nctions, may effect some important result in a body morbidly
fected; they may oppose, diminish, and combat pathological
sions, and arrest their progress; they may excite organic ef-
rts, which will prove salutary; the disease may abate in
olence and intensity, and a marked improvement in the con-
tion of the patient may be obtained. Such a result will con-
itute the second part of the effects of this medicine, and are
nerally called the *secondary* or *therapeutical* effects. In-

stead of making the latter depend on, or flow from, the former, persons have been accustomed to attribute them to the influence of some special property or virtue. We shall now consider these two parts of the action of medicines separately.

1st. *Of the immediate effects of medicines.*—The immediate effects of medicinal substances comprise all those changes which the developement of their activity may produce in the living system. All the parts of the body feel the influence of the pharmacological agent when it has been administered, though the results of its action are not equally appreciable, nor are they everywhere perceptible. The changes or modifications produced in the blood or the organic elements will always remain concealed from the scrutiny of our senses; it is only by the change produced in the performance of the several functions that we can judge of the nature of the impressions which medicinal substances make on the tissues of our organs. When the body is subjected to the influence of a medicine, the action of the latter may be exerted, 1st, on the fluids of the body; 2nd, on its solids; 3rd, on the movements of the several organs of the body. With regard to the first, viz. the action of medicines on the fluids of the body, as little can be advanced that is not conjectured and hypothetical, we shall say nothing.

The only way in which we can conceive medicinal substances to exert their action on the *solids of the body*, is by their producing a change in the physical disposition, in the length, cohesion, density, &c. of the elementary fibres which constitute the tissue of our organs. As the elementary fibres constitute by their approximation and interlacement the several tissues, so these several tissues form the organs, whose aggregate constitutes the entire living structure. Each of these organs has a determinate function to discharge, a function regulated by fixed laws; wherefore, by observing the variations produced in these several functions, we may appreciate the ecies of impression made on the tissue of the organ by a edicinal substance, the internal operation of such substance eing rendered sensible and apparent by the differences which ay be observed between the activity of each organ at the eriod previous to the exhibition of the medicine, and that hich it possesses whilst the system is under the influence of e medicine. The nature of the changes in the functions of ny organ leads us to a knowledge of the immediate effects roduced on the tissue of the organ : thus, when we observe a imulant produce an agreeable feeling of heat in the epigastric gion, excite an appetite and accelerate digestion, is it not ob- ous that this agent has stimulated the tissue of the stomach, as developed its vitality, and increased its natural powers ? hereas, when we observe an opiate to destroy all desire for od, which had previously existed, or to suspend the process f digestion which was already commenced, is it not evident at it must have, as it were, stupefied the fibres of the stomach, at least perverted their proper action ? In the same way, hen we see an alcoholic medicine accelerate the pulse, does it ot prove that the tissue of the heart then receives an impression hich stimulates its fibres ? The alvine evacuations, colicky ins, abnormal secretions of a gaseous or liquid character, hich take place during the operation of purgatives, clearly ove that they produce irritation in the alimentary canal.

All persons possess not an organization absolutely identical. hough the human body is always composed of the same mber of organs, these organs by no means present the same ze or the same importance in all individuals. In one person e cerebro-spinal apparatus, either in its entire extent, or ly one of its centres, as the encephalon or spinal marrow, edominates by unusual developement ; whilst in another rson these same parts are extremely small and diminished in e. In the latter individual it is the stomach and digestive organs which predominate, and manifest this predominance by a keen desire of food, ready and rapid digestion, quick return of appetite, &c. In another, the stomach and intestines have but small extent; their parietes are thin, feeble, and delicate. In another person, again, the heart claims attention in consequence of its power, or, on the contrary, in consequence of the feebleness with which it propels the blood.

Now all these dissimilarities of constitution, all these organic individualities, have a remarkable influence on the operation of medicines. They explain why the same medicinal substance, given to several persons, produces effects on some much more marked and striking than on others; and why phenomena very obvious in some, will scarcely be perceived in others. This substance has directed its action to the same parts, but the result of its action cannot be equally or similarly expressed in bodies in which these parts have not the same strength or predominance. Thus a stimulating substance will not have the same effect on a person with a small, flat, narrow brain, and in one with this organ well developed. Nor will this same stimulant accelerate the circulation in a man with a small heart and arteries in the same manner as in an individual who happens to have this organ and the entire arterial sytem well developed. This will discover to us the cause of those shades, inequalities, and differences so often observed in the effects of the same medicines.

It may here be observed, that all the living solids of organic tissues are not equally sensible to the impression of medicinal substances. The parts most susceptible of these impressions are the tissues of the digestive and respiratory organs, those of the heart, arteries, and capillaries, that of the brain and its appendages, those of mucous and serous membranes and of the secretory organs; whilst, on the other hand, the cellular tissue, the lymphatic ganglia, aponeurotic d cartilaginous structures, are nearly insensible to all such pressions. It is of great importance, in a therapeutical int of view, to remark, that disease modifies very much e susceptibility of all the organic tissues. Thus, in fever d inflammation, the brain and circulatory apparatus, the ngs, stomach, and intestines, &c., are much more sensible the action of medicines than in the state of health. Nay ore, so great is the difference which disease induces in the eration of medicines, that when any organ is inflamed, it is to almost exclusively that the entire power of the medicine ems to be directed. Thus, if a stimulant be administered in y inflammatory affection, the part so affected feels an increase of heat, pain, and tension, whilst the ordinary effects the substance so given are not at all perceptible in other rts of the system. Thus a person having an ulcer in any rt, experiences in that part lancinating pains, after taking re stimulating food or drink than usual.

From what has been said regarding the action of medicinal stances on the several organic tissues, it is obvious that the y means for ascertaining the medicinal properties of such stance, is to attend to the changes or modifications made by in the several functions performed by these organs. The aggate of these changes constitutes the physiological effects of substance. The effects are to be ascertained by attending he several functions of digestion, circulation, respiration, the eral secretions, &c. &c. These physiological effects may be er local or general. When a small dose of any medicine is en, its effects are for the most part local, and confined to the t in which such medicine may be applied: thus, for ince, a small dose of a tonic being taken into the stomach, its effects confined to that organ, enabling it to discharge functions more perfectly and with more ease: the action of llyrium is confined to the eye; that of an injection into the urethra merely produces a modification in the secretion of its mucous membrane. With regard to the general physiological effects, that is, the modifications produced by medicinal agents on the functions of the circulation, respiration, &c., the greatest importance should be attached to them, inasmuch as it is on these the therapeutic effects mainly depend. Of these effects some are more important, and deserving particular attention, whilst others are of secondary importance and almost insignificant. Among the former are to be classed the modifications produced by any medicinal substance on the functions of the brain, lungs, heart, stomach, on the secretions, &c. Such are the important effects which should be noted with attention, inasmuch as it is these which give the real character of the medicinal substance. Thus care should be taken to note the occurrence of pain or weight of the head, any change in the mental faculties, any aberration in vision, or in the exercise of the other senses, or any irregularity in muscular action. To the subordinate or less important effects may be referred those transitory or indescribable sensations experienced internally during the time the system is under the influence of a medicine, as also the changes produced in the physical qualities of the secretions and exhalations, &c.

In considering the importance of the changes which medicines are capable of determining in the vital functions, though we no longer place that implicit confidence in the omnipotence of medicinal agents, which the followers of the humoral or of the mechanical pathology did, who, referring all diseases to some secret alterations in the fluids or solids, directed their exclusive and undivided attention to correcting those morbid changes which they supposed to occur in these parts, expecting that by restoring them to their natural condition they should restore the body to health; still the dominion of the physician over the animal economy, in regulating and modifying its arious functions, will, on examination, be found of considerable xtent. Thus, let us suppose each of the organs of the body its natural state; should we wish to accelerate the functions f digestion, we may do so by administering a stimulant; ould we, on the contrary, wish to retard or suspend that funcon, this can be accomplished by means of a narcotic. Again, o we wish to strengthen the stomach, and to render it more ble to discharge its functions, we can effect this by means of a nic. Over the circulation of the blood the physician has qual dominion: he can accelerate it by some substances, and tard it by others. We know that animal heat is also under e influence of medicinal substances. The respiration too can e accelerated or retarded by certain medicinal agents. The cretions and exhalations are likewise under the influence of e physician. We know that by the exhibition of a purgave or emetic the liver is stimulated to a more copious secreon of bile; the cutaneous system, as also the action of the idneys, can be excited at will.

It is, however, in reference to the apparatus of innervation, hat the physician should attentively study the action of edicines. The impressions made directly by them on the rebrum, cerebellum, and spinal chord, and also the sympaetic influence propagated to these parts from other organs to hich medicinal substances may have been applied, are the urces of numberless phenomena which develope themselves the mental faculties, in the muscular movements, and even the circulation, respiration, &c. It is well known how, hen the brain, spinal chord, or their membranes are excited, e vitality of other parts is also developed: should the imression thus made be confined to the brain, and be continued o long, its functions become disturbed; if the spinal chord or e great sympathetic be the seat of the impression, we observe rresponding alterations in the functions of the parts connected with them; the action of the heart becomes irregular, the pulse unequal, respiration becomes difficult, and the functions of the stomach and intestines are disturbed.

When we thus consider the power which medicinal agents exercise over the animal economy, we have sufficient reason to be surprised both at its extent and importance. By means of it the physician appears to have all the organs of the body, and their respective functions, as it were, under his control. Through it he possesses manifold and valuable resources, by which, if he cannot always destroy the cause of disease, he can frequently attack morbid lesions with success, combat the prevailing symptoms which threaten to prove fatal, and by opposing a medicinal to a pathological disturbance, arrest the further progress of the disease.

Secondary effects of medicines.—The effects which are called secondary follow the immediate or primary effects; they are dependent on them, and both stand to each other in the relation of cause and effect. Medicinal substances, by the developement of their inherent properties, subject the entire system to an operation more or less marked, more or less extensive; an impression is made on the organic tissues, the result of which is a change in the state of the several organs, and consequently in the manner in which these organs perform their several functions. In health, this disturbance so occasioned by the medicinal substance is easily borne, and the system returns to its normal state immediately after the medicine has ceased to act; there may probably be observed a little fatigue or languor, more especially if this medicinal action has lasted for a considerable time, and has been attended with a profuse evacuation. Such an effect, though it appear but insignificant, constitutes what may be called the secondary effect. But when disease exists, these effects become much more important. A change has now taken place in the state of the organic issues—a change, too, which is progressing ; the movements of he several organs have become abnormal and irregular, their unctions are disturbed ; a morbid process is now set up on diffe-ent points of the body, threatening various parts with engorge-nents, effusions, ulcerations, &c. In this state of things a nedicinal substance is employed, which, from the nature of its owers, cannot but influence the developement, course, and haracter of the morbid lesions. It may alleviate or exaspe-ate all the symptoms of the disease by the change it may ffect in the state of the affected tissues. Now this change, of vhatever kind it may be, will yield the secondary effects of nedicinal substances.

For the purpose of avoiding confusion, it is necessary to dis-inguish between those effects which immediately follow the mployment of medicines, and which depend on the impression nade by their molecules on the several organs, (immediate or rimary effects,) and those ulterior effects which proceed from he primary, when they occur in a body actually diseased, (secondary effects). When we attribute to a medicinal sub-tance, febrifuge, stomachic, anodyne, &c., properties, it is al-vays a curative or secondary effect, and not an immediate ffect, we have in view. The effects which these terms desig-iate are not necessarily connected with the impression made y medicinal substances on the several organs. A particular ondition of the body is required in order that such effects hould appear. It is only when a substance diminishes or uspends the morbid phenomena which each of these terms lenotes, and removes the lesions which gave rise to them, that ve recognize the febrifuge, anodyne, antispasmodic powers f the substance ; such terms are merely the representative igns of the beneficial results obtained ; but they denote nothing eal or positive in the medicinal substance itself.

In comparing the primary and secondary effects of medicinal substances, and in distinguishing the one from the other, we should consider:

1. That every medicinal substance possesses in itself an active property, residing in the chemical principles which constitute it, and which is called forth as often as the substance is brought in contact with some part of the living body; the existence and nature of this property being ascertained by the changes it produces in the state and functions of the organs.

2. What is called the secondary or curative property is not, then, connected with the material quality of the substance, nor dependent on its chemical composition; such property being but a mere fiction of the mind, intended to explain the beneficial results produced by such agents.

3. The immediate or primary effects of a medicine are always sure to take place whenever such medicine is employed; if any difference should occur, it will be in degree, not in kind. Thus, an excitant will always stimulate tissues, purgatives will always irritate the intestinal surface.

4. The curative effects are not thus constant and uniform. How often do we see the medicine which passes as the most efficacious in some particular disease disappoint the physician's expectation, and, instead of giving rise to the favourable results which his experience in its use had led him to hope for, produce effects of an entirely opposite kind! It is this uncertainty in the curative effects of medicines to which Hoffmann alluded, when he said that the same medicine, employed in the same diseases, with the same precautions, in the same dose, and at the same time, proved serviceable to one patient, useless to a second, and injurious to a third.

It may be asked whether there are such things as absolute tonics, that is, agents whose employment always and uniformly produces increase of vigour in the system, perceptible to the individual, and causing a freer and easier performance of the functions; the answer is, that no substances exist endowed with such a power. In this question it is evident that it is no longer the primary or immediate effect of the medicine that is contemplated, but an effect which no remedy can produce constantly and in all cases. Such an effect will always remain conditional, and refers to the secondary or therapeutical effects. If by absolute tonic be understood a substance capable of occasioning fibrillary contraction in the organs, and of thereby increasing their organic vigour, we might refer to bitters, gentian, or quassia, the employment of which never fails to develope tonicity in the several tissues. If, in irritation or inflammation of the primæ viæ, these substances excite nervous symptoms—debility, depression, &c.—they always act in the same way; but, in such a case, their operation augments and exasperates the existing lesion; it is, in fact, injurious.

5. The active property of a medicine is always the same; it never occasions a medicinal effect different from that which is the natural and usual consequence of its composition. Here, again, we must beware of confounding the secondary effects with the primary product of the impression of the medicinal substance. Thus, a medicinal substance possesses an emollient property—it relaxes the organic tissues, and diminishes their quantum of vitality; yet there are some cases where one would consider it endowed with an opposite property, where, in fact, it produces a strengthening result. When, in inflammatory diseases, and especially in membranous inflammations, there is depression, prostration, and absolute sinking, an emollient drink soon restores the patient to his strength. Now it is evident that this beneficial result is a secondary or therapeutic effect. This emollient, demulcent medicine, by its intrinsic virtue, abated the violence of the inflammation, and reduced the irritation of the circulating system; the improvement obtained in the condition of the patient proceeds from this operation.

In the same way disulphate of quinine has been known to produce hypnotic effects. A person has been known to experience, every night immediately after going to bed, a febrile paroxysm, which kept him awake for the entire night. This state continued for a considerable length of time, notwithstanding the employment of opium. The patient was directed to take six grains of the quinine three hours before going to bed. From the first day he adopted this treatment, he slept well during the night. Are we to conclude from this that quinine is a narcotic? Certainly not; it merely removed a febrile movement, which was periodical in its attacks, and so drove away the sleeplessness depending on it.

6. The curative or therapeutic effects possess not the unity of the primary or immediate effects. Experience shows us that the curative virtues of one and the same medicinal substance may be very various; it may be febrifuge, antispasmodic, tonic, sedative, &c.

CHAPTER VIII.

ON THE THERAPEUTIC ACTION OF MEDICINES.

The ancients, who attended merely to the therapeutic effects of medicinal substances, supposed medicines to act on the causes of disease. The moderns, on the contrary, consider them to act on the several organs of the body, and so direct their attention to the impression made by them on the several tissues, and consider the benefits experienced from their employment in disease to result from such impressions. Accordingly, when medicines diminish or remove the phenomena of disease, they do so by reason of the immediate effects which they produce, whether their action be local, as in the case of stomachics, or general, as stimulants in scurvy; or whether their action be at once general or local, as emmenagogues in amenorrhœa, stimulating diuretics in œdematous affections, or an action derivative or revulsive, as vesicatories, sinapisms, &c.

There are, however, some few medicinal substances which direct their action towards the causes of disease; as anthelmintics in the cure of worms, sulphur in the cure of psora, albumen in obviating poisoning by corrosive sublimate.

Medicines possess no special power distinct from their physiological action, and to which we can attribute the curative effects following their employment.

In proof of this principle, the following arguments may be adduced:

1st. A medicine never effects a cure of a disease till it has first exerted its power on the living tissues, and excited an organic action on the body. So close is the connexion between the immediate or primary, and the curative or secondary effects, that the former necessarily precede the latter.

2nd. When, by age, or by being badly prepared, a medicine has lost its power of acting on the system, or when, from habit or peculiar constitution of the individual, the organs have become insensible to its action, it is found to produce no therapeutical effect.

3rd. Those substances which are capable of producing the greatest change in the system, are found most beneficial in the treatment of disease.

4th. Medicinal substances, instead of proving beneficial in alleviating disease, are sometimes observed to produce injurious effects, and to aggravate the state of the patient. Such effects must evidently be the result of the unseasonable or excessive action of the medicine on the part affected. Why, then, should we not make the favourable results occasioned by a medicinal substance flow from the same source?

5th. Medicines, to be useful, must be administered at the proper time. A substance which would be beneficial at the onset of a disease will be useless in the middle of it, and mischievous at the termination. Now it is evident that if medicines possessed a positive curative virtue by which they were enabled to cure such or such a disease, the success of their employment would not then depend on the time of their employment, nor would it be subordinate to the tact or experience of the physician who prescribes them.

6th. External circumstances have been known to act as curative agents; thus, a fright has cured intermittent fever, by giving a shock to the system at the moment the paroxysm was about to commence. To such agents we surely cannot attribute curative virtues independent of the primary effects they produce on the system.

Thus, then, the practitioner, in having recourse to pharmaceutical compounds, employs substances which, in the first instance, excite disturbance. In employing them he knows full well whether he shall stimulate the organs, or quiet them; whether he shall strengthen the several tissues, or diminish their tension; whether he shall establish an irritation on a surface, augment some secretion, &c.; but beyond this he can know nothing for certain—the benefit to be derived from this action on organs is the work of nature. However experience, guided by the light of physiology, shows him whether he ought to reckon on the therapeutical result which he may hope; it renders more or less probable the improvement which he endeavours to produce by exciting the movement which the medicine is about to occasion.

It may be remarked, that in therapeutics probability assumes a peculiar character, which goes beyond the ordinary form of calculation. When a remedy is administered, the hope of succeeding in checking or mitigating the phenomena of a disease is chiefly strengthened by the existence in the diseased body of an internal force, which is constantly watching its preservation, and making continual efforts to bring it back to its normal state. Whilst a medicine is putting forth its power, Nature, on her part, is endeavouring to assist the organic movements which it excites; for she it is who effects the cure of diseases, and determines the success of the means employed. Thus we see the same morbid affections yield to very different. and even opposite, modes of treatment. If medicines possessed the power of curing certain determinate diseases, it would always be necessary to use those which were endowed with this especial power, and thus there would be but one way of treating similar affections. The art of curing disease, however, is not bound down to this regularity. Physicians, in the treatment of one and the same disease, do not follow the same line of practice; some have recourse to means not adopted by others; all follow particular modes of treatment, and, what is remarkable, they are all successful. Thus, then, it is Nature, and not the medicine, which, in pathological affections, restores the organs to their normal and healthy state. Medicinal substances are, to be sure, the occasional cause of this happy result; they determine it by exciting a salutary modification in the state of the diseased tissues, by giving rise to evacuations by the different emunctories, by favouring and aiding those effects which promise to be useful. But it is not directly that these agents have restored the calm; and the cessation of the pathological disturbance was not the necessary consequence of their special and active virtue being put into requisition. Moreover, the circumstance of two diseases being cured by the same pharmacological means will not warrant us in concluding that they both depended on the same lesions.

And here we may advert to that practical tact and adroitness which distinguishes some physicians, and which consists in making the most of our medicinal agents, in multiplying the resources which are at the disposal of the art of healing, and in creating them, when the ordinary resources are insufficient or ineffectual. Thus we often see practitioners whose fruitful genius devises new remedies, according as the disease gives rise to new phenomena. Though they employ the medicines ordinarily used under similar circumstances, they render them more powerful and beneficial by an unusual method of applying them; and it is worthy of remark that those physicians who are most distinguished for adroitness in applying remedies are those who do not believe in the existence of curative virtues, who consider medicines merely as instruments by the aid of which they may be enabled to destroy morbid lesions, and arrest the pathological movements depending on them.

It is because pharmaceutical compounds do not contain in them a special power of curing, that the dose and mode of exhibition of the most celebrated medicines always determine their success. It is not sufficient that the patient takes the medicine required by his state; it is further necessary that the immediate effects of the latter should be proportioned in intensity to the pathological lesion under treatment. Thus, if we wish to displace an irritation, seated in some internal viscus, by the revulsive or derivative action of a blister, the first condition for succeeding is to regulate the size of the topical application by the importance and intensity of the irritation we wish to remove. So that an important condition to be fulfilled in the practice of medicine is, to proportion the activity of the remedial agent to the intensity of the disease. It is necessary that the medicine should possess a degree of strength capable of interrupting the course of the disease, of combating the predominant symptoms, and of bringing back the affected organs to their normal condition.

All the effects produced by a medicine in different parts of the body are not equally useful in the treatment of the disease against which they are employed. Some of these effects, no doubt, have a tendency to mitigate and remove morbid lesions, whilst the practitioner cannot fail to see that there are other effects which are useless, or even injurious. His duty will then be to diminish or prevent the latter effects. Thus a person is troubled with a nervous cough, for the treatment of which opium would be useful; but this person may have had a slight attack of apoplexy, and a constant tendency of blood to the head. It is evident that to this man opium cannot be administered as freely as to one whose brain was perfectly healthy.

Thus it becomes necessary carefully to consider the impressions which a medicinal substance may make throughout the whole extent of the system, and also to be acquainted with its general, as well as with its specific, properties.

In order to appreciate the advantages derived from medicinal substances in the treatment of disease, it is necessary to study their immediate effects.

We have already stated that the curative results emanate from the influence of the active powers of medicines, and from the changes they produce in the diseased structures and in the entire system: hence arises the necessity of ascertaining the existence of these changes, of studying their nature, appreciating their importance and extent, if we would always refer to their true cause the improvements observed, and avoid attributing them to the medicine employed, when they really flow from another source. It is for want of attending to the nature of the primary and immediate effects of medicines, and in consequence of directing exclusive attention to their secondary results, that so much contradiction and so much false inference have been introduced into medical science. The sophism of *post hoc*, *ergo propter hoc*, is of frequent occurrence in medical discussions.

Some of the curative effects of medicinal substances do not appear till they have been for a considerable time in use. We often see that the effect of a tonic in improving the powers of the stomach is immediate. After employing a purgative or an emetic, we are soon able to judge whether their operation has been beneficial to the patient, or not. There are curative advantages, however, which can only be attained by a continued and prolonged use of remedial agents; it is then somewhat difficult to trace the immediate effects of those agents, and to discover how they become useful. A medicinal substance, whose immediate effects on the system are difficult to be appreciated, and whose curative effects are very slow in appearing, would at first seem to act only on the part which receives it, and to possess merely a local action; but, on calculating the result of a prolonged use of this substance, we find that its virtues were much more extended—we ascertain the important changes which it must have effected in the system by the striking cures occasioned by its use. Thus it will no longer appear extraordinary that induration of tissues, hypertrophy or atrophy of organs, and many other serious lesions, yield to the methodical and daily employment of an appropriate remedy, when we remember the quantity of the medicinal molecules which have penetrated the body and have been brought into contact with the diseased tissues, the length of time these molecules have acted, the many impressions made successively day after day, the modifications which nutrition and absorption must have undergone over the parts affected. There are some effects which do not appear till after the medicine has been for some time in use: thus vascular excitement, increase of heat, and other febrile symptoms, commonly supervene after resinous stimulants, or after the preparations of iron have been in use for several days; engorgement of the salivary glands after the use of mercurials, wasting of the glands after using iodine, lowering of the pulse after the use of digitalis.

Organic effects thus slowly produced are seldom attributable to the mere influence of medicinal substances; other circumstances, such as appropriate diet, proper exercise, change of climate or of season, generally contribute to the production of these favourable results. Often, also, by nicely establishing a correspondence between the hygienic and pharmacological treatment, we obtain results of the most important and beneficial character.

What is it which medicines do in the treatment of disease? —The solution of this question would be simple and easy enough, if the science of pathology had first determined what it is which disease does in altering the normal condition of the human body. The irregular movements, and the various disturbances of the organs observed in man when affected by disease, clearly prove that some change has occurred in the fluids or solids, that the body must have undergone some modification, partial or general, which no longer allows the normal or physiological order to continue. If we would endeavour to attain a knowledge of the nature of this change by investigating the changes which have occurred in the primary constituents of the fluids and solids, as whether there is an undue proportion in the elementary materials of the blood and of the organs; or if, without ascending to the primary elements, we would investigate the changes which have taken place in the secondary principles, as in the gelatine, albumen, fibrine, &c., we shall find we have not sufficient means of discovering the secret modifications which animal substances undergo, when disease has been developed in the system.

We must therefore adopt another method based on facts, and one to which our means of research are adequate. If we find that any organ ceases to perform its functions with normal regularity, there must obviously be some change in its state. Let us now, instead of investigating the changes which have occurred in the primary or secondary constituents of the part affected, confine ourselves to ascertaining what are the new and abnormal qualities which the diseased organ has acquired. If it be accessible to our senses, we should note the changes which have occurred in its external appearance, in its colour, consistence, temperature, &c. If it be removed from the direct examination of our senses, we should examine the region it occupies; we should employ the senses of sight and touch; percussion and auscultation, so as to ascertain what there exists foreign to the healthy condition of the part;

we should then consider the mode in which the affected organ performs its allotted functions, and note how far the performance of these functions deviates from the natural standard.

Such signs will reveal to us what it is which constitutes the disease, at least sufficiently so for practical purposes; they serve to express the internal changes which the organs undergo, when they have actually become the seat of disease. These signs, in fact, announce to us the characters of what may be called pathogenic lesions.

Having now ascertained a something positive in diseases by discovering the morbid lesions on which they depend, each of these lesions being marked by its proper characters, we have attained a knowledge of the difficulties which medicinal substances have to combat in the treatment of these diseases. It is these changes in the condition of the organs which they must remove in order that they may be found useful; in order that they may become curative agents, they must cause these lesions to disappear.

CHAPTER IX.

Classification of medicinal agents—that of Barbier—Dr. Murray—Dr. Billing.

Various bases have been adopted, from time to time, for classifying and arranging the substances employed in the cure of disease. Some have adopted the alphabetical system of arrangement; some have preferred the principles of classification used in natural history; some have taken the chemical composition of the various medicinal agents as the basis of their arrangement; whilst others, again, have taken the sensible qualities of these agents as the groundwork of their arrangement, and so have divided them into bitters, fœtid, insipid, &c. All these methods of classification have severally their peculiar recommendations, to a certain extent; but to the person who wishes to study the immediate effects which these agents produce in the system, or to determine the advantages which medical practice is to derive from their operation, such modes of classification are altogether useless.

We have already seen that medicinal substances possess the property of acting on our organs, that this property is always identical, and that it always gives rise to the same immediate effects. We have also seen that the curative effects of these substances are but a conditional result, one which does not necessarily follow their action on the system; hence it follows that these two kinds of effects do not present themselves to us with equally strong recommendations to serve as bases of medicinal classification. By the kind of impression which a medicinal substance makes on the tissues, and the nature of the organic phenomena which it determines, it will always retain its place in a pharmacological arrangement, as being fixed there by a stable and unvarying character; whereas, if the curative effects are made the elements of our arrangement, the whole matter becomes complex, and all unity is destroyed.

In conformity with the principles of classification now stated, M. Barbier has adopted the following arrangement of medicinal agents:—

MEDICINES—

which condense and strengthen the tissue of the organs	1. Tonics.
which stimulate the tissue of the organs and accelerate their action	2. Excitants. 3. Diffusibles.
which relax the tissue of the organs and diminish their vitality	4. Emollients.
which moderate the too great activity of the organs, especially of the circulating organs	5. Temperants.
which diminish the life of the cerebro-spinal apparatus	6. Narcotics.
which irritate the inner surface of the intestines, and give rise to alvine evacuations.	7. Purgatives.
which irritate more especially the gastro-duodenal surface, and excite vomiting.	8. Emetics.
which disturb the natural movements of the intestines, and cause them to expel their contents.	9. Laxatives.
which possess an especial mode of action, and do not come under the preceding heads.	10. Incertæ sedis.

Happy would it be for medical science if the physiological action of medicines could be made the basis of their classification. Unfortunately, however, our knowledge of their immediate or physiological effects is not sufficiently extended to warrant us in adopting this method of arrangement; the great importance and vast number of medicinal agents which M. Barbier places in his last class (incertæ sedis) would alone prevent us from adhering to it. Dr. Murray's classification possesses many and strong recommendations in a practical point of view; it is as follows:—

A. GENERAL STIMULANTS.

- a. Diffusible
  - Narcotics.
  - Antispasmodics.
- b. Permanent
  - Tonics.
  - Astringents.

B. LOCAL STIMULANTS.

Emetics.
Cathartics.
Emmenagogues.
Diuretics.
Diaphoretics.
Expectorants.
Sialogogues.
Errhines.
Epispastics.

C. CHEMICAL REMEDIES.

Refrigerants.
Antacids.
Lithontriptics.
Escharotics.

D. MECHANICAL REMEDIES.

Anthelmintics.
Demulcents.
Diluents.
Emollients.

Dr. Billing * has proposed a classification of medicines founded on their physiological action: he divides them into *stimulants, sedatives, narcotics, and tonics.* According to this original thinker and distinguished pathologist, purgatives, emetics, nauseants, refrigerants, blood-letting, &c., which form distinct and separate classes in ordinary works on Therapeutics, come in under the head of *sedatives*, and very properly so, if their constitutional effects be duly considered. As long as a dose of tartar emetic, or of Epsom salts, shall be devoid of the power of raising the pulse, increasing the temperature, &c., such substances will not be entitled to the place usually assigned them: namely, to the place of *stimulants.* With respect to Dr. Billing's class of *tonics*, it must be remarked that substances coming under this head must always be considered in reference to disease. He says,† "different substances, which, considered physiologically, or in health, belong to opposite classes, become, in disease, tonics. Even narcotics frequently become most usefully tonic; as, for instance, when rest is prevented by the morbid sensibility of a sore which cannot heal, banishing "kind Nature's sweet restorer, balmy sleep." Stimulants in this case cannot procure repose, nor give strength; sedatives are not required, or rather are contra-indicated; sometimes even one dose of a narcotic, by procuring a good night's rest, will renew the restorative energy of the system." With respect to the classes *diuretics and diaphoretics*, if the physiological action of the substances ordinarily marshalled under these two heads be closely observed, we shall find that some of them are sedative and others stimulant. As an instance of the mischievous consequences of these arbitrary and unqualified divisions of medicinal substances, we may adduce the conduct of an inexperienced practitioner, who, having ascertained that his patient passes but a small quantity of urine, immediately selects some formula from among the class of diuretics, the active ingredient of which is spirit of juniper, (stimulant,) when the most appropriate and effectual diuretic would in all probability be blood-letting. With respect to the class of medicines which go by the name of antispasmodics, do we not know that in some cases stimulants, in some narcotics, and in some tonics, are the most effectual agents in relieving spasm? Thus, in the convulsive effects produced by hæmorrhage, the best antispasmodic is brandy and opium, (stimulant,) whilst, in the spasmodic twitches accompanying tic douloureux, the best remedy is carbonate of iron (tonic). So much for the inconvenience resulting from the habit of taking names for things. In the classification which I shall adopt in this work, both in that part which treats of the physiological effects and therapeutical employment of the several classes of medicines, as also in the formulæ appended to the book, I shall endeavour, as far as I can, to preserve the spirit of Dr. Billing's arrangement; and, accordingly, whilst I adopt the four grand classes of narcotics, stimulants, sedatives, and tonics, I shall further present the therapeutical uses of the various subdivisions of medicinal agents, as found in the generality of works on Therapeutics.

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* First Principles of Medicine, passim.

† Op. cit., p. 95.

CHAPTER X.

Narcotics defined—Effects of—When indicated—Action of the narcotic principle—1st. In the cerebrum—2d. On the medulla oblongata—3d. On the plexuses of the ganglionic nerves—Opium, effects of, on digestive apparatus in health and disease—On the organs of circulation in health and disease—On the respiratory organs—Therapeutical employment—In diseases of the digestive organs—Of the respiratory organs—Of the cerebro-spinal system—in continued and remittent fevers—in acute rheumatism—Antispasmodics—Sedatives—Stimulants—Tonics—Astringents.

By the narcotic principle in medicines is understood that which diminishes the sensibility of the nervous system, lessens the perception of external objects, and checks volition, thereby allaying pain and promoting sleep.

Narcotics are usually defined to be "agents which first excite and then diminish nervous action, and in sufficient doses stupefy." They are said to differ from sedatives in their primary action being stimulant. By their being given in small doses their action may be altogether excitant. Narcotics, even when given in full doses, are capable of producing excitation at first; the pulse becomes stronger and quicker; skin hotter and drier; the nervous system more impressible; mouth and fauces drier, or their secretions more tenacious: these phenomena of excitation are, however, soon followed by those of an opposite character; the respiration becomes slower; skin moist; pulse down to natural standard, or even below it; the impressibility of the nervous system diminished; tongue becomes moist; in fact, all the symptoms now exhibit a sedative character. It is probable that in every case, however large the dose of the narcotic may be, some excitement always precedes the sedative effect; but the latter supervenes so rapidly on the stimulant effect, that the practitioner seldom directs his attention to it. The striking difference between the stimulant and sedative effects of the same agent may be readily understood from those cases of persons who have swallowed at once large quantities of alcoholic liquor. The sedative effects of this agent, which in smaller doses is so powerful a stimulant, so speedily supervene as to put a stop to all the functions, without any phenomena of excitement previously occurring.

Effects of Narcotics.—The first effects take place on the nerves distributed to the lining membrane of the stomach. These are rendered less impressible; this obtunding influence soon extends to the great nervous centres—thus, the function of innervation becomes impaired; and the gastric functions, both directly and indirectly, become diminished. If the narcotic be taken whilst a desire for food exists, such desire will be diminished or destroyed: if after food has been taken, the entire process of digestion will be totally or partially suspended. We can thus understand, that the administration of a narcotic may be followed by constipation, and hence infer its utility in the case of diarrhœa, where a sedative action seems to be indicated. In such a case, should the dose be considerable, the entire function of innervation may be obtunded, and both the secretions and peristole of the intestines may be diminished; whilst if the dose be smaller, the effect may be partial and confined to the nerves distributed over the intestinal apparatus. Irritation or inflammation existing in any portion of the intestinal canal may be allayed by a sedative dose of opium, and thus, by removing the pathological condition—the increased number and morbid character of the evacuations, which depend on such condition, may also be removed. The objection to the use of opium in the treatment of bronchitis, pneumonia, &c., on the ground that it diminishes the secretions, has been happily refuted by Dr. Dunglison. He states, that the different stages of inflammation of a mucous membrane produce two opposite effects on its secreting function; in the first stage the secretion is suspended—in the second, increased and morbid. Still the indication in both cases is the same, merely to remove the pathological condition of which these effects are but the symptoms: here, then, a sedative dose of a narcotic, which we know is capable of diminishing the force of the circulation and the energy of the innervation, and is therefore adapted to allay morbid sensibility, is clearly indicated; in the early period of the inflammation, where the secretion is diminished or suspended, it will restore the secretion; and in the subsequent stages, where the secretion is become profuse and morbid, it will diminish it—by diminishing the inflammation which occasions both phenomena. In cases of pneumonia, the administration of opium has been followed by a diminution or suppression of the expectoration where it had been previously free; this, however, arose from the opium being in too small a dose, where it acted as a stimulant, and consequently added to the inflammation.

We have seen that in cases of diarrhœa, opium may be employed with advantage for its constipating effects; it may be used with equal advantage where constipation exists, when such constipation depends on certain pathological conditions: we know that constipation is a frequent symptom of sero-enteritis; which symptom seems to be occasioned by the irritation which exists in the peritoneal coat, throwing the muscular tunic which is invested by it into inordinate or spasmodic contraction. Here opium, judiciously administered, so as to exert a sedative effect, will diminish the inflammatory action in the peritoneal coat, resolve the spasm in the muscular tunic, and thus remove the constipation; and we thus have a laxative effect induced by a remedy, which under other pathological conditions would produce directly opposite effects. Though, some time since, the employment of opium in inflammatory affections was chiefly, if not exclusively, confined to peritoneal inflammations, its use is now extended to similar pathological conditions of other serous membranes, and indeed of various other structures of the body—the practitioner, however, should remember, that in administering it in inflammatory affections, he must give it in such doses as to insure its full sedative effects; in such cases the opium is to be given immediately after the inflammation has been subdued by free bleeding and other antiphlogistic means; the bleeding checks the inflammation, and the opium removes the morbid sensibility which often remains behind, and which would wear out and destroy the patient, though the inflammation may be past. "On any relapse of the inflammation evinced by the skin becoming hot and dry," says Dr. Billing,* "the opium must be combined with renewed antiphlogistic remedies. The case must be closely watched for febrile symptoms, lest the anodyne, by allaying pain, deceive the practitioner, (of which there is great danger in inexperienced hands,) and the inflammation relight as it will, unless antiphlogistic medicine, such as antimony, digitalis, neutral salts, &c., be administered to keep it in check, in graduated doses, but by no means freely, though that were necessary at first."

The same writer observes that opium is, in many cases, employed empirically with antiphlogistic remedies to relieve pain; and that it is itself antiphlogistic very often, as, by its power of allaying morbid sensibility, it prevents the inordinate action of the heart, and so keeps the pulse from becoming hard.

In colica pictonum, opium may be beneficially employed in order to remove the state of constipation which accompanies this affection. The constipation here depends on the spasmodic state of the muscular tunic of the intestines,—a state which a combination of opium with some purgative, as with calomel,—is well calculated to remove. Here the opium resolves the spasm, and so allows the calomel to exert its ordinary purgative agency. For the same reason the combination of calomel with opium, or with the acetate or hydrochlorate of morphia, is very frequently administered in the treatment of enteric inflammation.

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* Op. cit. p. 113.

I cannot refrain from introducing here the following valuable, because practical, remarks of Dr. Billing * on the narcotic principle. "The NARCOTIC principle in drugs diminishes the sensibility of the nervous system, lessens the perception of external objects, and checks volition, thereby allaying pain and promoting sleep. Narcotics must be distinguished from stimulants on the one hand, and from sedatives on the other; and the distinction is the more necessary, because in nature the narcotic principle is generally combined with one or other of these, and sometimes with an acrid irritating matter, which renders it difficult to draw correct inferences from experiments made with these substances. Hence the contradictory and unsatisfactory reports of the value of different narcotic remedies, and the difficulty experienced in their application by those who do not know the reason why opium suits one case, hyoscyamus another. It has been very common to try one of these remedies first, and, if that did not suit, to resort to the other; but whoever knows that opium in its natural state contains *stimulant* and narcotic properties combined, will not administer it when the skin is hot and dry, with permanent thirst, delirium, and other evidences of symptomatic fever, (pyrexia,) but will on principle prefer hyoscyamus, which contains the *sedative* combined with the narcotic."

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* First Principles of Medicine, p. 86, Fourth Edition.

If we consider, more in detail than we have yet done, the pharmacological action of opium, which we may fairly consider as the representative of all the other substances of this class of medicines, we shall find that it produces the following phenomena :—

1st. If the drug be given in small doses, as a quarter of a grain of the extract, six or eight drops of Sydenham's laudanum, there is effected a calm, both on the physique and the moral, which has a tendency to produce sleep. The centres of innervation become obtunded, as it were ; the cerebral hemispheres are thrown into a state of inertia, or inactivity ; external impressions are no longer attended by their usual results, the ideas become languid, or entirely stopped ; the peculiar functions of the brain and spinal cord are diminished, as is also the influence of the ganglionic plexuses, and the several organic movements become retarded ; a disposition to sleep is observed to come on, and this sleep is calm and tranquil ; the action of all the organic fibres is diminished, and sleep follows this gentle and tranquil state of languor. Such is the effect we would always wish to obtain from the employment of opium ; but such an effect depends neither on the dose of the substance used, nor on the particular preparation of opium selected. None of the preparations of opium possess the happy privilege of invariably producing it. There are many morbid states in which opium does not produce this happy effect, or in which the effect produced is not of a sedative character. Sometimes, after the administration of it in small doses, the uneasiness of the patient appears to be augmented ; he complains of tinnitus aurium, restlessness, pain, &c.

2nd. An increased dose of opium, as half a grain of the extract, from ten to twenty drops of Sydenham's laudanum, appears to produce in the cerebral pulp a new change of state after that which we have just described; the course of the blood becomes retarded in this structure; this fluid accumulates there in a larger quantity, and imparts to the brain abnormal activity, giving rise to phenomena indicative of excitement.

Cerebral hemispheres.—The patient complains of tension and heat of head, and occasionally of lightness in this part; his face becomes flushed, tinnitus aurium is observed; if he awake, he is affected with hallucinations, both of hearing and seeing, with vertigo, confusion of ideas, a sort of delirium, &c.; if he fall asleep, he has disturbed dreams. If inflammation or cancer on any part of the body causes pain, this pain is less felt, and is considerably diminished. If, however, the pain be intense, and continues to disturb the brain, then the employment of opium produces pulsation within the cranium, delirium, a distressing state of languor, without the patient being at all relieved from his sufferings.

Medulla oblongata—Spinal cord.—These centres of innervation acquire an unusual and violent degree of power, which gives rise to involuntary contraction in the muscles, tremors, rigid spasm, and convulsive movements in the limbs; the general sensibility is also increased. It is also the disturbance of innervation that occasions the sense of squeezing referred to the region of the diaphragm, the embarrassment in the mechanical phenomena of the respiration, the palpitation of the heart, and occasionally vomiting, &c.

Plexuses of the ganglionic nerves.—Neither do the plexuses of the ganglionic nerves escape the action of opium. It is to the changes or modifications occasioned by it in the normal condition of these plexuses that we must refer the sensations of cold, heat, and perspiration, sometimes observed, as also the paleness and absence of expression in the countenance, the languid state of the eyes, uneasiness in the epigastrium, threatening of syncope, smallness of the pulse, &c.

3rd. These strong doses of opium are capable of throwing the encephalon into a new state. We have already seen that opium retarded the circulation within the cranium; if the blood goes on to accumulate in the brain, it produces intumescence of the medullary pulp, which soon becomes compressed by the parietes of the skull; thus the action of the cerebral hemispheres, and the functions of innervation, become suspended,

The signs of this congestion are, great weight of head, with a sense of fulness; the organs of the senses are less acute, vision becomes disturbed, the sense of hearing is impaired, as are also the senses of taste, smell, and touch; external impressions are less felt; the intellectual faculties are less active; a strange fixedness of the features is observed; a swollen state of the eyes, with falling of the eyelids; paleness, accompanied by a haggard, dull look; great difficulty in moving the limbs; the power of standing erect no longer exists; the person staggers, and speaks with considerable difficulty; the functions of respiration and circulation are impaired, the temperature of the body is lowered, &c. The congestion may proceed so far as to occasion the loss of sensation and motion, and even to bring on apoplexy.

This state of oppression and of narcotism does not always take place with the same facility; sometimes very large doses of opium will not produce it, whilst at other times it occurs after very small doses. When the brain or its membranes are the seat of any morbid lesion, the sanguineous congestion now under consideration is formed much more readily by the action of this drug. Small doses of this substance, which would only produce tranquil sleep in persons with the brain in a healthy state, occasion sanguineous congestion if given to persons labouring under arachnitis, or partial cerebritis, or to persons who have had an attack of apoplexy.

It is not easy to explain how it comes to pass that certain morbid states of the cerebro-spinal apparatus seem to prevent the occurrence of this congestion. We know that in tetanus large doses of opium are frequently given, without any signs of cerebral engorgement being observed. This cerebral congestion, so striking an effect of opium in the human subject, is not found to such a degree in the lower animals; this may be accounted for by the shortness of the neck in man, the great size of the encephalon, and the short distance of the brain from the heart.

Thus we see that opium produces in men three sorts of changes in the centres of innervation, and that with each of those changes certain particular phenomena are connected:—1st. There is a modification of that (molecular) action of pulp which retards the function that produces those vital principles with which this pulp supplies the nerves, and which these nerves then transmit to all parts of the body; the power and strength of the innervation is diminished; to this property of opium may be referred the calm, languor, and sleep, which so often follow its employment, and to this property also is the practitioner indebted for the power which opium possesses of removing morbid sensibility in the treatment of inflammatory and other affections. 2nd. If this drug cause a greater quantity of blood to tarry within the cranium, it will first stimulate the cerebral mass, and this is the cause of those phenomena which have induced the belief of cerebral excitement, as flushing of the face, hallucinations, abnormal muscular movements, &c. 3rd. If the quantity of blood become too great, sanguineous congestion will take place, which will suspend innervation; and the results will be diminution of the general sensibility, loss of muscular power, somnolence, stupefaction, and narcotism. This triple operation of opium will, in some measure at least, account for the disputes we so often hear regarding its properties. Some maintain that it acts as a stimulant; others confine their attention to its stupefying effects. We have now seen that it gives rise to phenomena which would countenance both these parties.

On Narcotic Medication.—It would throw considerable light on our study of the effects of opium if we could always distinguish the phenomena which depend on the direct changes produced by this substance on the organs from those phenomena which, whilst they are still observed on the same organs, yet have a sympathetic origin, and proceed from the action of opium on the apparatus of innervation.

DIGESTIVE APPARATUS.

Physiological state.—Opium occasions marked effects on the digestive apparatus: it generally destroys all desire for eating; if taken in the midst of a meal, or immediately after the individual has eaten, it seems to weaken or suspend the digestive powers; the food remains in the stomach without being submitted to the process of chymification; it is sometimes rejected, several hours after it has been taken, in its natural state of crudity. Opium seems to stupefy the digestive organs; if, after swallowing this drug, we wish to excite vomiting, double or triple doses of tartrate of antimony and potash must be exhibited. The state of constipation usually occasioned by the employment of an opiate proves the sluggishness of the large intestines; the habitual contractility of these organs is weakened, as appears from their suffering the fæcal matters to tarry in them, which, in the normal state, excited of themselves the organic efforts necessary for their expulsion.

Opium and the salts of morphine produce dryness of the mouth and throat; they excite thirst, and even vomiting. These effects do not depend on the impression of these substances on the digestive organs, since they occur with equal certainty when they are applied to the skin. Vomiting is caused by the abnormal state into which the medulla oblongata and spinal cord are thrown; it accompanies dizziness, confusion, and weight of head. The plexuses of the ganglionic nerves also perform a considerable part in the phenomenon, for the vomiting is accompanied with sweating, smallness of the pulse, cold, paleness of the skin, change in the features, &c.

Pathological state.—Opium, by its immediate action, irritates ulcerations of the gastric surface, and excites vomiting. If there be cancer of the stomach which is not yet open, this substance may frequently diminish the sensations of pricking and dragging, as also the feeling of distress of which the patient complains. We are sometimes astonished at not seeing symptoms of cerebral affection in these cases, such as swelling and injection of the eyes, vertigo, hallucinations, &c.; it would seem that the sympathies of the stomach are then broken up, or that absorption has ceased to take place.

Considerable irritability of the coats of the stomach, and debility of these same parts, sometimes co-exist. In such cases the combination of opiates and tonics are found serviceable, the former by restoring the stomach to a state more favourable for digestion, and the latter by strengthening the organ.

The action of opium on the intestines, when morbidly affected, is equally interesting. If slight and partial irritation exist in the intestinal mucous membrane, opium generally removes it; it dissipates colics and arrests diarrhœa. If the irritation on this surface be very intense and extensive, opiates are often found to produce acute pain, purging, and, at the same time, symptoms of cerebral disturbance. If the intestinal tissues, or the peritoneum, are inflamed, opium no longer calms the uneasiness and pain felt by the patient; it produces a distressing somnolence, and sometimes vomiting. Should a cancerous affection exist in the intestinal tube, opium is sometimes found useful in temporarily appeasing the pain and distress occasioned thereby.

ORGANS OF CIRCULATION.

Physiological state.—Some will have it that opium stimulates the heart and renders the pulse more frequent, whilst others maintain that it diminishes the contractions of this organ. Amidst these contending opinions, all are agreed on the irregularity and inequality of the arterial pulsations after the use of opium. The same instability is observed in the state of the pulse from the use of belladonna, hyoscyamus, stramonium, &c.; it is found successively, and at short intervals, small and round, sharp and full, always irregular and unequal. Accordingly, if the character of the active power of opium may be inferred from its effects on the circulation, we must conclude that it is neither stimulant nor sedative, but of a disturbing nature; it neither produces excitement nor depression of the circulation, but marked disturbance in its natural action.

The phenomena produced by opiates on the function of circulation seem to proceed from their action on the centres of innervation, on the medulla oblongata, spinal marrow, and the plexuses of the ganglionic nerves. If we suppose that after the employment of an opiate the influence of the nerves on the heart becomes lessened, that this influence then becomes disturbed, and alternately stronger and weaker, and that it acts on this organ irregularly, as it were by jerks, we shall be enabled to account for several of the phenomena observable in the circulation after the employment of opium.

We have stated that the fulness of the pulse and dilatation of the artery was one of the effects of opium; and we think that the reason of this phenomenon is to be found in the capillary system. We are taught by physiology that the blood poured by the arteries into the capillaries is subject only to the contractile action of these latter vessels. When the stupefying power of opium has extended to the entire system, and consequently to the capillaries, their relaxed tissue allows the blood to tarry in them, and this fluid fills the vascular fasciculi, which are ordinarily empty in the natural state. The capillary system soon becomes very much developed and swollen, but the course of the blood in this part is much retarded. That, however, which is perpetually brought to the capillaries by the arteries, meets an obstacle to its progress; it seems to flow back on itself, and to dilate the arterial canals, the retractile power of which probably is also weakened. This plethoric state of the capillaries, by accounting for the fulness of the pulse during the action of opium, discovers to us at the same time the source of several other phenomena produced by this substance, as the redness and swollen state of the face, and especially of the eyes, the developement of heat, diaphoresis, cutaneous eruptions, itching of the skin, dilatation of the erectile tissues. At different times during the action of opium and of the salts of morphine in large doses, there comes on a diminution in the calibre of the entire arterial system; it is this which renders the pulse small and concentrated. There is observed, at the same time, paleness of the skin, a lowering of temperature. All these effects depend on the modification then produced in the ganglionic nerves, and in the change which then occurs in their influence on the circulating vessels. Cerebral congestion, whether it be occasioned by opium or by any other cause, is always accompanied by slowness of the pulse, which proves the diminished and impaired powers of innervation.

Pathological state.—When febrile disturbance increases the heart's contractions, and renders them stronger and more frequent, opium no longer produces a sedative effect; it but adds to the disturbance already existing in the arterial actions, and in the heart's pulsations. In such cases, sanguineous congestion readily takes place in the brain; even a moderate dose of opium will then drive the blood to the head, produce great oppression, somnolence, delirium, &c.

In hypertrophy of the left ventricle of the heart, opium has also a great tendency to occasion cerebral congestion, distressing weight of head, swollen state of the countenance, temporary deafness, &c.

Clinical experience proves that there are some weak pulses which opium renders stronger, slow pulses which it accelerates, strong pulses which it weakens, &c. These effects are less the result of a modification produced in the condition of the heart, than of some change which the opium occasions in the vivifying powers of the medulla oblongata, spinal cord, and the ganglionic plexuses.

RESPIRATORY ORGANS.

Physiological state.—Both the mechanical and the chemical part of the functions of respiration appears equally modified by the powers of opium. All agree that it retards the respiration. If it diminishes the number of inspirations and expirations in a given time, it is obvious that a smaller quantity of oxygen will penetrate the bronchial ramifications. Hence, if opium diminishes the vital action of the lungs, it must interfere with the performance of that function which converts venous into arterial blood. And this is actually the case; for, after the employment of opium, this fluid, on entering the several tissues, appears no longer to exercise that stimulating influence on them, which kept up their action and their various movements. The fact of opium occasioning cerebral congestion proves the change it is capable of effecting in the chemical phenomena of respiration. The blood of persons who have been poisoned with opium has been found of a deep black colour, even in the left ventricle.

Pathological state.—In irritation of the mucous membrane of the lungs, opium often diminishes the tension and dryness of this membrane, restores the exhalation which moistens its surface, and the secretion of the mucous cryptæ which cover it, and changes the painful character of the cough, and renders it easier and more moist. Also, when the lungs are filled with tubercles, opium is found useful in calming the cough, and in procuring some rest, if not sleep, for the patient.

The effects of opium on the *urinary organs* in the healthy state are not very striking; when a calculus irritates the pelvis of the kidney, or the ureters, this substance is useful in soothing pain, and in facilitating its passage.

The action of opium on the *apparatus of innervation* has been already considered.

With respect to the action of opium or other narcotics on the *muscular system*, it may be observed that, when taken internally, they occasion less precision in the acts of locomotion; tremors and convulsive movements in the limbs are produced; some difficulty in the articulation is also experienced, &c. These phenomena do not depend on the action of the opiate particles on the muscular tissues; they show that the course of the innervation is perverted, and that it is only by jerks and irregular movements that the nervous influence flows from the spinal cord into the muscles. If sanguineous congestion of the encephalon take place, the muscular power is first diminished, and, if such congestion go on to increase, complete paralysis is induced.

ON THE THERAPEUTICAL EMPLOYMENT OF NARCOTICS.

The high character of narcotics as medicinal agents is not of a recent date. Sydenham considered opium as a gift of Heaven. He goes so far as to say that, in losing opium, medicine would lose a considerable part of its power: *ut sine illo manca sit, ac claudicet medicina.* By considering all the physiological changes which narcotics occasion in the body when affected with disease, we may readily conceive the extent of the services which they are capable of rendering to the practitioner. A methodical and judicious employment of them will calm disturbance or painful affections of the system, moderate excessive and abnormal sensibility, diminish painful sensations, and procure sleep. By their help the physician can remove spasms, and those various irritations which so frequently occur in different parts of the body. It is chiefly to their action on the brain, spinal cord, and ganglionic plexuses, that we are indebted for the curative effects of this class of medicines. As these parts preside over the movements and actions of all the organs of the body, by producing a sudden change in their actual state, we may instantly succeed in producing corresponding changes in all the other systems and parts of the economy.

Diseases of the digestive apparatus.—When the coats of the stomach are in a state of inflammation, opium, or the salts of morphine, are not admissible, as they are observed in such circumstances to occasion thirst, dryness of the mouth, oppression, &c. Neither in cancerous affections of the stomach will the employment of opium always succeed in relieving pain. There are, however, many affections of the stomach in which opiates are found beneficial. Thus we often find spasmodic vomiting, cramps of the stomach, colics proceeding from over-excitation of the spinal cord and nervous plexuses, and occasioned by the influence of inordinate innervation on the stomach, yield to the employment of these substances. In such cases the coats of e stomach are healthy, and the impression which the opium akes on its nerves suddenly changes their actual condition, nd removes their morbid state.

Those partial inflammations, or even ulcerations of the in- estines, which sometimes exist in diarrhœa and dysentery, de- and the employment of opium. This agent first diminishes he colicky pains and the abdominal tension, &c.; it frequently hecks the inflammation which is going on within the intestinal anal, and restores its surface to the healthy state. When the rge intestines are the seat of the morbid lesion, the opiate ay be advantageously administered in the form of enema. n those colics which depend on inordinate or excessive inner- ation in the intestines, opium is our most valuable remedy.

Diseases of the circulating organs.—Opium has been found seful in allaying those palpitations of the heart which were wing to abnormal innervation; but in inflammatory affections f this organ, or of the pericardium, this agent is rarely em- loyed.

Diseases of the respiratory organs.—An opiate taken at ight, in the commencement of a *catarrh*, procures sleep, iminishes the cough, and renders it less painful, disposes to a alutary perspiration, and so leads to a speedy cure. In cer- ain cases of pleuritis and pneumonia, which appear to be asso- iated with a morbid state of the cerebro-spinal apparatus and f the ganglionic plexuses, the use of opium is often very bene- icial. In *hæmoptysis*, where it is an object to suspend the ough, which, by its violent effect on the lungs, tends further o augment the capillary congestion in those organs, and so to ncrease the sanguineous discharge, opium is found useful by he state of rest and repose in which it places the respiratory pparatus. *In phthisis*, also, opium is a valuable agent, by its ower of quieting the cough, mitigating the patient's sufferings, nd inducing sleep. In convulsive asthma, and dyspnœa pro- eeding from the effect of morbid innervation on the respiratory organs, opium is often found to produce very prompt and extraordinary relief.

Diseases of the cerebro-spinal apparatus.—In slight irritation of the cerebral membranes, and when such irritation is of a recent date, and very limited in extent, opium is said to prove beneficial; but when the inflammation of these same parts is extensive, intense, and well established, this agent is no longer found useful. In the treatment of the neuroses the employment of opium requires great caution, from its power of bringing on cerebral congestion, which might aggravate the disease, more especially if there already existed a tendency of blood to the head. In mania, hysteria, convulsions, &c., considerable reserve is necessary in the use of this agent, each of these affections being, in general, the particular form under which various lesions of the encephalon, spinal cord, and ganglionic nerves, often present themselves. It is obvious that in order to be able to judge whether the action of opium is likely to prove useful in mitigating or removing these affections, it becomes necessary to know the actual state of the cerebro-spinal apparatus in the individual affected; otherwise we proceed in the dark under the guidance of mere symptoms.

It is clear from what has been said that narcotics may be used as excitants or sedatives where the object is to allay pain, induce sleep, and diminish morbidly increased action; for such ends they must be administered in sufficiently large doses. Where, on the other hand, the object is to add to the amount of excitement, small doses are indicated. Where, in consequence of *uterine* or other *hæmorrhages*, the nervous impressibility becomes irregularly developed, and from the erethism of the nerves distributed to particular blood-vessels, these vessels take on an increased action; in such pathological condition, the obvious indication is to allay the irritability of the nervous system thus inordinately developed, and the best mode of accomplishing this is by administering a full sedative dose of opium. We have already spoken of the value of narcotics in the treatment of *inflammatory* affections. Narcotics are sometimes administered in *intermittent fevers*, with the view of stopping the expected paroxysm; this they effect, probably by the new action which they induce in the nervous system, which interrupts and breaks in on the chain of morbid action already existing in these affections.

In *continued* and *remittent fevers*, accompanied with extreme watchfulness and restlessness at an early period of those diseases, narcotics have been frequently employed with advantage, in sufficient quantity, however, to ensure their sedative influence. In the *spasmi* of Cullen and some of the *vesaniæ*, as *delirium tremens*, narcotics are, at times, the only agents which afford relief, and it is astonishing what large doses of them may be taken without the production of narcosis. In such cases they act as antispasmodics, and, by inducing a new action in the nervous system, they remove that which may give rise to the spasmodic phenomena.

In the treatment of *acute rheumatism*, opium given in full doses has been found extremely beneficial. Dr. Corrigan* has published a series of very interesting cases of this affection, in the treatment of which opium was found decidedly serviceable; he conceives that such a mode of treatment possesses the advantages of shortening the duration of the disease, of preventing the occurrence of pericarditis, endocarditis, &c., and of husbanding the patient's strength. To attain these advantages from the drug in this affection, it must be given in full doses, and the dose must be augmented, both in quantity and frequency, till the patient feels decided relief, and it should then be kept up at that dose till the disease is steadily declining. From ten to twelve grains within the twenty-four hours will be found the average quantity required.

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* Dublin Journal, Nov. 1839.

ANTISPASMODICS.

Antispasmodics are defined to be "substances which allay irregular muscular contraction." Dr. Paris* states, that there are certain substances which appear to possess the specific property of controlling spasmodic action ; such as assafœtida, galbanum, musk, castor, ammonia, valerian, &c. He adds, however, that "in a more general view of the subject, we must admit that this class branches, by indefinable gradation, into narcotics and tonics ; for since spasm may be connected with the most opposite states of the body, it is very evident that many of the individuals included in this class of antispasmodics can only be relative agents: spasm, for instance, may arise from excessive irritability, as from teething, wounds, worms, &c., in which case a narcotic would prove beneficial ; or it may depend on a state of general debility, the proper remedy for which would be the administration of an aromatic stimulant, or, the assiduous exhibition of some permanent tonic."

Dr. Dunglison doubts whether we are acquainted as yet with any medicinal substance which acts directly on the muscular fibre. He considers all the substances included in the class of antispasmodics as *indirect* agents, removing and relieving spasmodic action, by their agency being exerted on other parts of the nervous system than on those concerned in the muscular contraction—in fact, he seems to consider that such medicines produce their medicinal effects by revulsion.

The term spasm is generally applied to involuntary contractions, more especially of the voluntary muscles ; these have been divided into "tonic" spasms, and "clonic" spasms,—the former consisting in permanent rigidity of the muscles affected, as in common cramp,—and the latter in alternate contractions and relaxations, as in the convulsions of infants.

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* Pharmacologia.

From the *juvantia*, spasm would appear to be a decidedly
ervous phenomenon; and if so, it must be admitted, that the
medies adapted for its removal must exert their influence on
me part of the nervous system, and not on the muscular
ores, as is too commonly supposed.

Dr. Dunglison regards the only 'true' or direct antispasmo-
cs as revellents, producing their remedial effects by virtue of
e new impression they make on the gustatory or gastric
erves, and thus deriving from the inordinate action going on in
me other portion of the nervous system.

In discovering the character of the several diseases of the
asmodic or convulsive kind, there is sometimes not a little
ifficulty, with a view of treatment, in ascertaining whether
ey are connected with an inflammatory or congestive condi-
on of vessels, or are dependent on exhaustion or irritability
f the nervous system.

In those cases of spasmodic action not connected with in-
ammatory action, anything capable of producing a new
ervous impression will prove antispasmodic. Narcotics do so
y allaying the impressibility of the entire nervous system.
We know that strong mental emotions are capable of proving
ntispasmodic; thus the spasmodic affection of the diaphragm,
alled hiccough, is frequently removed by a sudden mental
motion. Dr. Thomson relates a striking instance of the
anative effort of fear in a case of hooping-cough kept up by
abit. The patient, a young boy, was threatened with the
pplication of a large blister, and though it was not applied,
ut merely placed within his view, the dread of it completely
emoved the cough. Boerhaave is said to have cured epilep-
ic fits in several patients, by taking a red-hot poker, at the
pproach of the attack, and threatening to push it down the
hroat if the patient should have a fit. These are instances
f the simple revulsive effect of fear, and in the same way

any mental emotion may prove antispasmodic. In reducing luxations the surgeon avails himself of the same aid; he endeavours to direct the mind of the patient away from the consideration of the accident, and, by concentrating his thoughts on some other idea, he diminishes or removes the inordinate contraction of the muscles around the dislocated joint; then, by suddenly exerting his skill at reduction, he frequently succeeds in making the bone to slip into its place.

To those who deny the existence of direct or true antispasmodics, and who will have it that such substances produce their effects by their stimulant properties, as also by the impression they make on the nerves of two of the senses, it has been objected that assafœtida thrown up into the rectum relieves a fit of hysteria; to this, however, it may be answered, that the whole effect is produced by the stimulating power of the gum resin, which is proved by the fact that the same effect will be produced by injecting an excitant; even one which has never been considered an antispasmodic. A turpentine enema has often produced the same effect. In fact, the beneficial result is produced by the new impression made on the nerves of the rectum, which is derived from the morbid condition seated elsewhere in the nervous system.

Tetanus is an affection in which the efficacy of direct antispasmodics, if such there be, would appear peculiarly applicable; yet we seldom see those substances which have been so considered, as musk, castor, &c., employed in such a case. Indirect antispasmodics, as opium, are chiefly relied on in the treatment of this affection, enormous doses of which substance can be borne without any signs of narcotism being induced. Dr. Dunglison relates a case of tetanus algidus, or tetanus from cold, which fell under his own observation, and which may serve to illustrate the manner in which antispasmodics produce their effects. A oung man, whilst heated, threw himself into a river to athe. In the course of a few hours he was attacked with tanus in the form of opisthotonos. After the unsuccessful mployment of narcotics, he was taken out of the bed, aced in a brook that ran by the house, and pailful after ailful of cold water was thrown over him whenever the pasms became violent. After a little time the spasms ielded, and by continuing the treatment they ultimately left im. Here we may conceive that the remedy employed ade a new impression on the nervous system by the shock ccasioned by the cold affusion, and in this way broke in upon he chain of morbid phenomena.

Chorea is a disease where the direct antispasmodics would eem to be indicated, and yet they are seldom used. The isease appears generally to depend on great mobility of the ervous system, chiefly of the part connected with the nerves f the voluntary muscles, together with diminished impressi-ility of the ganglionic nerves,—hence tonics and purgatives re chiefly relied on, which then become "indirect" anti-pasmodics.

In *epilepsy*, a powerful impression made on the nervous ystem a little before the paroxysm is expected, will often-imes prevent it. For this purpose, the direct antispasmodics may be given; or a large dose of assafœtida, castor, or usk. In such cases the mental antispasmodics have been ound serviceable; in fact, any agent which excites a new and owerful impression on the nervous system, may be fol-owed by the same results. Epilepsy being generally accom-anied by great impressibility of the nervous system, tonics, nd more especially metallic tonics, are chiefly relied on in s treatment.

Asthma is another of those affections in which the indirect ntispasmodics, and more especially narcotics, have been found beneficial; thus large doses of opium are administered; stramonium is smoked; galvanism is employed; and all these means are occasionally beneficial. The direct antispasmodics, however, are seldom resorted to.

Hooping-cough, the seat of which is considered by some to be in the pneumo-gastric nerves, is another of those convulsive diseases in which antispasmodics are indicated. Those of the indirect class, however, are alone employed. Narcotics, and of these belladonna, have been found beneficial.

In *common colic* both the direct and indirect antispasmodics may be effectually employed, as also in some forms of gastrodynia. When these affections are dependent on causes which may be removed by a gentle stimulant, assafœtida may be given with benefit. In flatulency, also, the same agent is found serviceable.

In *hysteria* alone the direct antispasmodics are employed. In this affection the nervous irritation being supposed to be seated in the cerebro-spinal axis, whence it radiates to every other part of the system, the indication is to divert the nervous action to some other portion of the frame. With this view the practitioner administers substances which are as nauseous as possible, combined or not with a stimulant, as he may think proper.

In the treatment, however, of spasmodic affections, we may, in conclusion, observe that the spasm is but a symptom depending on some morbid condition of the economy, and that the most rational as well as most successful mode of relieving the one is to remove the other.*

SEDATIVES.

By the sedative method is understood, in the more extended sense, that method which has for its object the dininution or suppression of the too violent and inordinate manifestations of life as caused by disease. Such sedative effects may no doubt be produced by a variety of means, antiphlogistic medicines being in most instances sedative. But by the sedative method we here understand that method which has for its object the moderating of nervous irritation, which depends on exalted sensibility of the nerves, and is occasioned by a primary, and not a sympathetically-excited affection of the nervous system.

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* See Thomson ed. art. 1628.

Next to the actual removal of all irritants which excite or keep up nervous irritation, those means are most effectual in its cure, which diminish the sensibility of the nervous system, and also have the property of stopping irregular movements in the muscles, and which are especially called *sedatives*; and also according to particular effects, *anodynes*, from their property of removing pain; *antispasmodics*, from their power of removing spasm; *narcotics* or *soporifics*, from their property of inducing sleep. Many aqueous, oily, and fatty substances have also the power of producing a sedative effect; the derivative or counter-irritant mode of treatment may do the same. In many cases, also, compression of the nerves may check nervous action, prevent the transition of an affection to the sensorium or other parts, sometimes also may check and soothe pain, and avert attacks of spasmodic and other nervous diseases. Strengthening medicines also, many of which, as quinine, have a paregoric effect, diminish irritability of the nerves; and these are to be employed for such purpose, or to be combined with sedatives proper, where great debility exists at the same time, and where yet the irritability of the nervous, or the tenderness and mobility of the muscular, fibres is not so great, as that moderate stimuli should occasion violent movements. Thus also refrigerant applications, and cold, more especially tepid bathing, the temperature being gradually lowered, may prove useful for diminishing nervous irritability, as also for imparting strength.

With respect to the individual sedatives, it may be observed that many substances appertain to this class, which are in another place ranked under the head of stimulants, and which exhale some of them an agreeable, and others a disagreeable odour, and which, besides being nervines and more or less stimulating the vascular system, produce at the same time a sedative and antispasmodic effect, and may therefore be called stimulating antispasmodics. The most important of this class are musk, castor, valerian, chamomile, assafœtida, oleum cajeputi, camphor, &c. The odour also arising from the combustion of some animal substances, as hair, feathers, &c., produces a sedative and antispasmodic effect. Generally speaking, sedative substances which emit fœtid and disagreeable smells are better borne by hysterical patients, and produce more certain and permanent effects, than those which give out pleasing odours. The more powerful among these stimulating and at the same time sedative remedies are so much the more indicated, if considerable debility be combined with this nervous irritability.

Other substances, which, without producing any perceptible excitement of the vascular system, have the power of quieting and moderating the too violent and inordinate action of the nervous system by a peculiar, and an as yet unexplained influence, and are more especially capable of producing an antispasmodic effect, are the oxydes of zinc, bismuth, copper, &c., more especially the flowers of zinc, magistery of bismuth, ammoniuret of copper, sugar of lead (which besides its astringent has also a sedative power); in like manner the fixed alkalies, magnesia, the mineral acids, and especially sulphuric acid. Ipecacuanha also, tartar-emetic, and other emetics, are requently very useful as counter-irritants, and, in consequence of their subsequent sedative effects, as antispasmodics.

Some will have it that there is no substance which is capable of producing a primarily sedative effect; they assert that all such effect is occasioned by exhaustion from over-stimulation; in other words, that the sedative effects are but secondary, being uniformly preceded by a state of excitement. The effects of digitalis, however, as well as of blood-letting, are decidedly of a primarily sedative character, as has been clearly shown by Dr. Billing. The effect of direct sedatives is to diminish the action of the heart, and to repress the nervous influence; when these substances are given in excess they produce anxiety and despondency, and depress the nervous system to such a degree that it can no longer direct the muscles; giddiness, staggering, and indistinctness of vision, are observed to occur. The same effects are produced by great loss of blood.* Thus we see that opposite states of the system may exhibit similar symptoms; the remedial means applicable in the one case being inapplicable or injurious in the other. As an instance of this may be adduced the coma of children, which arises from inanition, and which might be mistaken for a plethoric state of the internal vessels; this condition is well known to be relieved by stimulants.

"We see," says Dr. Billing,* "that when nervous influence is expended to the degree that ordinarily induces sleep, or the suspension of sensorial action, this suspension is retarded if any irritation produce a renewal of sensations, as the pain of toothache; or if the extra-excitement of anxiety, in cases where affection or interest is concerned, continue to occasion extrication of nervous influence in the brain, and this power of continuing cerebral action (wakefulness) will be increased by introducing into the stomach a sedative, such as digitalis, or green tea, which, by diminishing the force of the pulse, and by its influence on the brain, counteracts the plethora which would induce sleep." "Sedatives, as opposed to stimulants, diminish the injection of the brain, at the same time repressing the nervous influence, so that the proximate cause of delirium, stupor, or coma, from *sedatives*, is *inanition;* whereas the proximate cause of delirium and coma, from *stimulants*, is congestion or plethora."

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* Op. Cit. p. 81.

† Ibid, p. 82.

The same writer happily explains how it comes to pass that tea and coffee, which are sedatives, sometimes favour sleep: such a result, he says, may be attributed to the circumstance that sleep is often disturbed in consequence of a superabundance of blood in the brain, occasioned by the use of stimulants. For a somewhat similar reason sedatives, as digitalis, are capable of inducing sleep, where excitement and wakefulness have been kept up by cerebral or pulmonary congestion, &c.

Hyoscyamus, which combines the narcotic and sedative principles, may in many cases take the place of opium; when given in duly apportioned and not too strong doses, it induces sleep; it is however generally milder than opium, does not stimulate the vascular system, nor does it produce constipation; and accordingly may be given in preference to it in febrile and inflammatory affections. In too large doses it is known to produce convulsion, dilatation of the pupils, delirium, &c.

Many of this class of substances, as belladonna, stramonium, &c., excite an extremely irritable, spasmodic or convulsive state, irregular motions, contraction of the iris accompanied by dilatation of the pupils, &c.; but though they may produce stupor and sleep, they are not certain soporific substances, and therefore cannot be substituted for opium; they are beneficial only in particular cases, as in hydrophobia, tic-douloureux, in melancholy and mania, epilepsy, and other spasmodic affections. Several substances, as nux vomica, and St. Ignatius' bean, which contain a peculiar bitter principle, and also an alcaloid, strychnine, act as violent irritants on the nervous system, especially on the spinal marrow; they are accordingly administered in cases of paralysis. Other acrid sedative substances, as aconitum, digitalis, tobacco, conium, dulcamara, &c., possess the property of promoting several secretions and excretions, and are therefore more employed in particular diseases, where such effects are called for, than as sedatives.

Several medicinal substances reckoned among narcotics, as preparations containing prussic acid, laurel water, &c., possess the property of diminishing sensibility and irritability without inducing sleep, or without any stimulation preceding their sedative effects.

Dietetic means, and more especially mental sedatives, are sometimes very important by themselves, and sometimes are found useful when added to other such remedies; as for instance, warm, soothing, mucilaginous drinks, almond emulsion, mild diet possessing no irritating properties, air of an agreeable warmth, warm baths, gentle rubbing with the hand, rest of body and mind, darkness, as also the removal of all objects which may excite the imagination, stillness, confining the imagination by exciting a different action of the mind, or by a proper employment of the understanding, calmness and serenity of mind, soft music, &c.

As it may be inferred from what has been already said, that the employment of the sedative method is so much the more indicated the more the cause of the nervous state to be relieved lies in the nervous system itself, so, in employing it, regard must be first had to the cause of the irritation, for this obvious reason, that the same sedative means are not always to be applied. However, if the nervous irritation depend on material irritants, and is so great as not to admit of the treatment directed against the latter, recourse must first be had to sedative remedies, before the radical cure be attempted. When also other causes predominate in diseases, but nervous irritation is connected with them, with the radical indications for removing the cause, corresponding sedative means are to be combined; and these latter may, according to circumstances, be added to emetics, purgatives, tonics, &c. Here also it may be observed that sedative remedies which at the same time are heating, are to be avoided if an inflammatory state exist; whilst, on the contrary, stimulating antispasmodics are indicated in those cases where debility is combined with nervous irritation. And accordingly sedative remedies must be selected according to the degree of the irritation present, those of a milder quality against the minor degree; but the stronger sedatives, and especially narcotics, which when properly used are so very beneficial, and when abused are so very detrimental, are not to be employed without sufficient grounds.

Those substances which have been placed by some writers in the class of *temperant* and *refrigerant* remedies, may also be considered sedatives, from their power in controlling the circulation; the principal of these are the vegetable and mineral acids, and the alkaline salts. The admission of cool air is also a valuable refrigerant, and its employment in febrile affections is attended with the most grateful and salutary effects. At one time this therapeutic instrument was entirely excluded; the temperature of the sick room was kept elevated, and hot liquids were exhibited for the purpose of concocting some fancied peccant matter, and aiding its expulsion from the body. In the management of febrile affections the instinctive desire for cold drinks is now no longer opposed. In fact, the internal exhibition of cold fluids, and the free admission of cool air into the apartment—to be regulated, however, by the state of the weather and the feelings of the patient—may be looked on as amongst the most important elements of our treatment of febrile cases. On the same principle, the ventilation of the sick-room should be carefully attended to, whereby the quantity of febrile heat is diminished, as well by the contact of fresh portions of cool air, as by the increased evaporation which necessarily takes place.

"When cold fluids," says Dr. Dunglison,* "are taken into the stomach, they produce an effect there analogous to what occurs when they are brought into contact with a portion of the cutaneous surface. They are indeed the best refrigerants of the internal kind; and, of these, cold water—ice cold—or iced lemonade, may be regarded as the best. Every one must have observed how rapidly and copiously the perspiration breaks out over the surface of the body, during the heats of summer, after a glass of cold water has been taken. This must be owing to the refrigerant influence of the low temperature reducing the erethism which exists in the mucous membrane of the stomach, as it does in every part of the dermoid surface, whenever the temperature is extremely elevated. By reducing the erethism of the mucous membrane to the healthy standard, the sedative influence is propagated at once to every portion of the capillary surface, and the cutaneous transpiration is augmented by the diminution of the exalted actions of the cutaneous exhalants. This is the only mode in which the phenomena can be rationally explained. It is impossible for us to admit that the fluid can pass by imbibition so rapidly into the vessels as to account for it. The perspiration, in such cases, breaks out almost instantaneously after the fluid has reached the stomach and impressed the lining membrane."

Besides the refrigerants now mentioned, other agents, whose modus operandi is not so easily explained, have been admitted into the materia medica. "There are," says Dr. Paris,* "certain saline substances which, by undergoing a rapid solution, and acquiring an increased capacity for caloric, produce a diminution of temperature, and if this take place in the stomach, the sensation of cold which it produces is equivalent to a partial abstraction of stimulus; this being extended by sympathy to the heart, occasions a transient reduction in the force of the circulation, and by this, or by a similar sympathetic affection, causes a sensation of cold over the whole body."

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* Therapeutics, p. 465.

"There is a circumstance," says Dr. Dunglison, "connected with the use of these refrigerant salts, which is full of interest to the therapeutist, and exhibits that wandering from the true track of which philosophy has to deplore the existence of so many examples in the history of medical science. I have remarked that internal refrigerants have been made to comprise, in many definitions, saline substances which, by undergoing a rapid solution, produce a diminution of temperature in the stomach, or elsewhere; and the definitions have been so worded and intended, as to include such substances only. Yet, strange to say, the attention of the therapeutist has strayed from the circumstances that occasion such substances to be refrigerant; and we often observe a mixture, containing the nitrate of potassa in solution, directed to be administered at intervals throughout the day. In this mode of administration the whole refrigerant effect must necessarily be lost. The mixture must attain the temperature of the chamber; and if the nitrate of potassa produce any effect, it must be of an excitant character. The practitioner, notwithstanding, places great reliance, perhaps, on his febrifuge mixture; and this at least is fortunate, for, whilst he is adminisring it, he is not as likely to be officiously irritating the in- stinal canal by repeated cathartics. In this way the use of the ert compound may be followed by positive advantage." In is critique of Dr. Dunglison's we are inclined to think that ere is a sad wandering "from the true track, not only of philo- phy, but also of the handmaid of philosophy, viz. logic. First, e doctor objects, and fairly enough, to making the "production f diminished temperature by rapid solution" the essential ifference in the definition of refrigerants, and yet, in the very ext sentence, he actually assumes the correctness of such de- nition, and calls the nitrate of potass, when administered at ntervals, so that the mixture may attain the temperature f the chamber, whereby the whole refrigerant effect must ecessarily be lost, an "inert compound." The refrigerant ffects of nitrate of potass, as a sedative, when given dissolved n even tepid drinks, such as whey, are known to every one.

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* Pharmacologia.

Several hypotheses have been proposed for explaining the peration of refrigerants. Dr. Murray has endeavoured to ccount for it on chemical principles. He first assumes that nimal heat depends on the consumption of oxygen in the ungs, and that this is influenced very much by the nature of he food, &c., taken into the stomach; that when such food onsists of substances containing a small proportion of oxygen, he consumption by the lungs is increased, and the animal heat s accordingly increased; whereas, when the food contains much oxygen, and especially in a loose state of combination, an pposite effect takes place in the lungs. Thus the celebrated diver, Mr. Spalding, observed that whenever he used an animal diet, or drank spirituous liquors, he consumed the oxygen of the air in his diving-bell in a much shorter time than when he used a vegetable diet and water for drink.

Sir B. Brodie's experiments on the cause and production of animal heat are the most recent and satisfactory. He found that when the functions of the brain are suspended by dividing the spinal marrow, the power of producing animal heat was also suspended ; he ascertained that the action of the heart can be kept up by artificial respiration after the brain is removed, and that although the blood undergoes the ordinary changes, yet that the animals on whom these experiments were made cooled rapidly. This would incline us not to refer the production of animal heat solely to the chemical changes which take place in the lungs.

Sir B. Brodie's experiments were made on rabbits in which the spinal marrow was divided, and the functions of the brain thereby suspended. " It may, perhaps, be said," says Sir B., " that in these experiments the secretions had nearly, if not entirely, ceased ; it is probable that the other changes which take place in the capillary vessels had ceased also, and that although the action of the air on the blood might have been the same as under ordinary circumstances, yet there might not have been the same alteration in the specific heat of this fluid as it flowed from the arteries into the veins. But, on this supposition, if the theory of Dr. Crawford be admitted as correct, there must have been a gradual but enormous accumulation of latent heat in the blood, which we cannot suppose to have taken place without its nature having been entirely altered. If the blood undergo the usual change in the capillary system of the lungs, it is probable that it must undergo the usual change in the capillary system of the greater circulation also, since these changes are obviously dependent on and connected with each other."

The conclusion to which these experiments would lead is, that the production of animal heat is a vital process dependent in a great measure on the integrity of the nervous system ; a conclusion which receives considerable support from a fact stated by Mr. Earle, who observed that in a case where the xillary plexus of nerves on one side was crushed, as occurred an accident which came under his own care, the paralyzed mb of that side was of a lower temperature than that of the pposite side. Objections, however, have been urged against us making the production of animal heat depend on the in- uence of the nervous system. Acephalous fœtuses are ob- erved to keep up their temperature during the little time they ve, and vegetables, which are destitute of a nervous system, reserve a certain degree of temperature, and resist the in- luence of external cold: the most probable state of the case s, according to Dr. Thomson,* that both opinions are, to a ertain extent, true, and that the production of animal heat is dependent partly on the nervous system, and partly also on the chemical changes which take place in the lungs. Dr. Thomson's mode of accounting for the modus operandi of refrigerants is this: he supposes that when cold is applied to the surface of the body, the capillaries of this surface have their activity immediately diminished, and, from the wide extent of these vessels over every part of the body, their action cannot be materially lessened without the entire body feeling the effect; thence the vigour of the heart and arteries is materially diminished by the abstraction of caloric from the capillary branches of the system. The function of respiration immediately feels the effect so produced, and the blood does not undergo the ordinary changes; black blood is thus carried to the brain, whereby the nervous system becomes in a manner paralyzed; hence all the functions depending on the energies of the brain are rendered torpid. He then conceives that something like this which takes place on the surface also occurs when the same kind of substance is taken into the stomach, and from the sympathy which is known to exist between the stomach and skin it is not improbable that the same kind of influence over the entire system is equally experienced in both cases. Such is the theory proposed for explaining the action of this class of substances; but, as its propounder well observes, "any theory is of little value; it is more useful to attend to the phenomena connected with the operation of those articles than to theorize on their action on the living system."

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* El. Mat. Med. vol. i. p. 493.

EFFECTS OF REFRIGERANTS.

On the digestive apparatus.—When the stomach is in the normal state, little effect is produced on this organ by the employment of refrigerants; some of the substances, however, of this class, as the acids, when given duly diluted, gently stimulate its tunics, thereby increasing the appetite and facilitating digestion. Some of them, when they contain a considerable portion of acid in their composition, and when taken in considerable quantity, such as a concentrated decoction of tamarinds, cream of tartar, &c., stimulate the coats of the intestines, and produce alvine evacuations. When the mucous membrane of the stomach is in a state of irritation, refrigerants, more especially the vegetable acids, are found effectual in removing the sensation of thirst, nausea, heat, and disrelish for food; when this organ, however, is the seat of a more intense form of disease, these same substances, even in a dilute form, occasion considerable pain in the epigastrium, and sometimes a burning, pricking sensation. When the stomach is the seat of cancer which is not yet open, acidulated drinks are often effectual in removing the nausea and eructations which are so very distressing in this affection; in the case of open cancer, however, in consequence of the exquisite sensibility of the part, acids are no longer borne by the patient. What has been said of the stomach is equally true of the large and small intestines.

On the organs of circulation and respiration.—In the normal state of these organs, the employment of refrigerants produces no perceptible effect on their functions; but when there exists a state of excitement, accompanied by increased force and frequency in the action of the heart and large vessels, the effects produced by the employment of refrigerants are to moderate the inordinate action of these organs, and to remove the morbid tension of the pulse. Their action also on the capillaries is no less marked; when the circulation in these vessels has become rapid and hurried, and the temperature of the body is much increased beyond the natural standard, refrigerants are found to possess the property of moderating the internal disturbance, and of lowering the morbid heat of the body. It is well known that persons labouring under fever evince an instinctive eagerness for acidulated drinks.

With respect to the respiratory organs, the effects of refrigerants are not at all perceptible in the state of health in changing either the mechanical movements, or the chemical phenomena of respiration; but when given in the febrile state, these agents, by retarding the circulation, must effect some change also in the phenomena of respiration; the blood is then brought less frequently into contact with the oxygen of the air, and to this circumstance we may, at least in some degree, refer the decrease in the animal heat.

The effect of refrigerants on the *urinary organs* is, at all times, to augment their secretion. When the secretion of these organs becomes suspended, as often occurs in fevers, these agents are found effectual in re-establishing the secretion. Blood-letting, (a refrigerant,) oftentimes resorted to in order to fulfil another indication, is generally followed by a copious flow of urine.

On the nervous system.—In the healthy state of the body, refrigerants produce no sensible effects on this system; but in certain morbid states, as in excessive sensibility of the medulla oblongata, medulla spinalis, and the ganglionic plexuses, when inordinate and excessive innervation is distributed to all the organic structures, the use of acid drinks is generally followed by disagreeable sensations and painful effects, which sometimes are carried so far as to deprive the patient of rest, and even of sleep. These effects are chiefly observable in hypochondriacal males and hysterical females. Dr. Thomson mentions the case of a man who was labouring under inflammation of the spinal theca; whenever he swallowed an ordinary effervescing draught, he immediately suffered from a sensation of pricking over the surface, the skin became so sensitive as scarcely to admit of being touched, and the whole habit restless and uneasy.

With respect to the *therapeutical* employment of external refrigerants, such as the cold affusion, or dashing cold water on the naked body, and cold ablution, or sponging, there is a distinction of some importance to be made. As the cold affusion makes a powerful impression on the nervous system, it is of course indicated where our object is to produce a revulsive effect, to break in upon a morbid chain, as, for instance, to cut short a fever; but this agent is inapplicable whenever the fever has continued for so long a time that we can no longer indulge a hope of cutting it short, and when there may be danger of producing congestion in some internal organ by such a violent impression on the system. When, therefore, our object is to produce a sedative effect, by diminishing febrile heat, we generally prefer the cold ablution, or sponging a part of the body, as the upper or lower extremities; the warm pediluvium, or foot-bath, is also employed for the same purpose.

In the employment of the cold affusion we must be guided by the state and feelings of the patient, by the stage of the disease, and the season of the year. The season of the year must determine the temperature of the water, which may average from forty to sixty degrees Fahrenheit. The temperature of the patient's body must be ascertained before employing the cold affusion; this is to be done by placing a thermometer with a small bulb, and curved at the extremity, in the axilla or under the tongue of the patient, with the mouth shut. In this country, according to Dr. Thomson, the temperature of the body seldom exceeds one hundred and eight degrees in the severest forms of fever, whilst, in warm climates, it is observed to rise to one hundred and twelve degrees. With respect to the period of the disease, it may be observed that the sooner the cold affusion is employed after the subsidence of the rigors of the cold stage the better, in which matter, however, the practitioner will do well to attend to the temperature of the body; and a precaution of some importance to be observed here is, that even though the thermometer should indicate a morbid degree of temperature, still the cold affusion should not be employed if the patient feel much chilliness; it is scarcely necessary to say that it should not be resorted to if the temperature be below the healthy standard. These precautions being duly observed, the employment of the cold affusion, in inflammatory fever, where there is no congestion or inflammation of any internal organ, is usually attended by the following favourable results:—it reduces the morbid heat, lowers the pulse, and abates the intensity and violence of all the symptoms. Another thing to be attended to in the employment of the cold affusion is the state of the skin with respect to moisture; this agent should never be resorted to if the skin be bedewed with perspiration, the great rule being to see that, in the employment of cold in fever, *the skin be steadily hot and dry.* Dr. Currie seldom or never employed cold affusion after the fifth day of fever; when the disease is more advanced, the sedative effects of it on the exhausted system of the patient are too severe to be borne; the syncope, also, which is so apt to occur in the advanced stages of fever, when the patient is placed in the erect position, seems very naturally to contra-indicate the use of this agent. In such cases tepid or warm sponging may be resorted to, the effects of which, though not so permanent as those of the cold affusion, are still productive of considerable benefit by lowering the morbid temperature, reducing the frequency of the pulse, and removing the morbid irritability of the patient. In this case the temperature of the water may range from seventy-one to eighty-six degrees Fahrenheit.

Besides idiopathic continued fevers, there are other diseases also in which the applications of cold bath, cold water, cold drink, and cool air to the surface, are found serviceable. With respect to the application of cold to the surface, it is necessary to take care that no internal visceral congestion or inflammation is present. And first, in inflammatory affections of the brain, as in phrenitis, the application of cold to the scalp is attended with the most striking and beneficial results. "In no disease," says Dr. Thomson,* "does the powerful sedative influence it possesses display itself so conspicuously as in phrenitis. The most furious delirium is quickly subdued by allowing cold water to drop on the vertex, whilst the rest of the scalp is covered with cloths moistened with vinegar and water." Besides the external application of cold water, the use of cold drinks in the several forms of febrile diseases is uniformly attended with beneficial results. We know that at one time strong prejudices existed against them in the treatment of fever. These prejudices arose from the pathological notions of the day, one of which was, that a certain amount of febrile heat was required for concocting or ripening the peccant matter, which should be thrown off before the fever could subside. These prejudices have, however, now almost entirely disappeared, and the beneficial effects of cool drinks, as well as of cool air, in febrile and inflammatory affections, are universally recognised.

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* Op. cit.

In the eruptive fevers the advantages resulting from the cooling regimen are as striking as in those of the idiopathic form. A time was when the free admission of cool air was considered to exercise an injurious influence by checking the eruption in small-pox and scarlet-fever; but there is no class of therapeutical agents more valued or more valuable than refrigerants in these fevers. In scarlatina, more especially, the cold affusion produces the most decided advantages, when judiciously employed during the height of the eruption. This, together with cool air, by the astringent action exercised on the distended and enfeebled capillaries of the skin, is most effectual in restoring the perspiration, the total suspension of which is one of the most characteristic symptoms of scarlatina.

The free admission of cool air in the treatment of small-pox, during the eruptive fever, is attended with the best results, by the comfort it affords the patient at the moment, and by rendering the disease milder in its subsequent stages. Dr. Thomson tells us that the Hindoo physicians were in the habit of plunging their patients, in this form of the disease, into cold water, and with the happiest results, the chief of which were diminishing the fever, as also the number of the pustules, and lessening, also, the risk of pitting. In arresting hæmorrhages of every kind, the value of cool air, and of cold applications, is universally recognized.

Such are the principal dieases in which the employment of cold has been found beneficial. "Much,* however, it must be admitted, depends on the discrimination, the judgment, and the observation of the practitioner in determining the temperature of the application, the time, and the exact condition of the body in which it should be employed. It is unnecessary to add to these remarks, except to point out the means of counteracting the degree of collapse which sometimes follows the application of cold water, guttatim, to the vertex. In this case the state of sinking is to be treated exactly in the same manner as when extreme debility suddenly occurs, whatever may be the cause; external warmth, particularly the application of bladders of hot water to the scrobiculus cordis, friction, electricity, and the artificial inflation of the lungs, if the degree of collapse be very considerable, are the means to be employed; and, when the individual is capable of swallowing, the administration of excitants, particularly aromatics and ammonia."

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* Dr. Thomson, Op. Cit.

STIMULANTS.

Stimulants may be defined to be "agents which increase the organic actions by impressing the contractility of the part to which they are applied, the stimulation so induced being extended, or not, to the rest of the system." *

The organs generally selected to be impressed by the exhibition of stimulants is the stomach; sometimes, however, the skin and mucous membranes, especially the Schneiderian membrane, and the lining membrane of the rectum, are the parts selected.

Most of the stimulating agents used in medicine are obtained from the vegetable kingdom; the stimulant property depending on the presence of an essential oil, or some similar principle; this oil is usually separated by distillation from the plant, as in the case of carraway, aniseed, lavender, &c.

The *general effects* of stimulants are an exaltation of the functions of innervation, circulation, and calorification; thus the nervous susceptibility is very much augmented, the frequency and strength of the pulse are increased, and the animal heat is very much developed. These effects require a considerable dose of the stimulant. A smaller dose than is necessary to produce this effect, may serve to stimulate the lining membrane of the stomach to a more copious secretion of its digestive fluid, and the muscular fibres to a greater activity, so that the processes of chymification and chylification may be facilitated and accelerated, and the various secretions and excretions may be more readily affected. Should the dose, however, be carried too far, irritation or even actual inflammation may be excited in the part with which the stimulant comes in contact, and a state of fever may be induced, whereby many of the functions above enumerated, especially the secretions and excretions, may be very much retarded.

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* Dunglison's Therap.

Several of the medicinal substances which are usually arranged under different classes, are really stimulants. Thus the whole class of counter-irritants and epispastics are considered stimulant by some. As it is not, however, so much for their stimulating as for their revulsive effects they are employed in medicine, they are not ranked among the stimulants proper. Mercury is also a stimulant. Under its influence a febrile state is induced, accompanied by a general excitement of the whole glandular apparatus, more especially of the salivary glands; this artificially-induced disease is incompatible with the specific disease for which the mercury is taken, namely syphilis, and accordingly the latter gives way.

In order to have a more precise idea of the action of this class of substances, we shall consider them in reference to the several systems.

Digestive Organs.

Physiological state.—Stimulants act in two ways on the digestive organs. 1st. Immediately on being taken they stimulate the stomach and intestines, the liver, pancreas, &c., by their local and direct action, as also the nervous centres, so closely connected by sympathy with the gastric organ. 2nd. When the stimulating principles have been carried into the torrent of the circulation, and penetrate with the blood into all the organic tissues, they exert their stimulating powers on the stomach, intestines, &c.

The influence of these substances on the digestive organs is very manifest when they are taken internally ; a sudden developement of vitality takes place in the epigastric centre. A feeling of heat, referred by the individual to the stomach, indicates the species of effect which is then produced in this organ ; the muscular coat of this viscus is made to contract, so that its cavity becomes diminished. Hence the functions of the stomach are aroused ; if it be empty, a craving for food is observed to take place ; if the individual be just after eating, the powers of the stomach are called forth, so that the food is elaborated with unusual rapidity. The same effects are produced in the intestines. The secretions of the liver are also promoted and increased by substances of this class.

The physiological effects produced by stimulants are, however, dependent on the dose taken. Small quantities increase the powers of the digestive organs ; chymification is facilitated and accelerated ; the organic action of the intestines acquires increased force and energy ; all the principles capable of being converted into chyle are extracted from the food, and there is frequently a tendency to constipation. Such is the result we obtain every day from the use of the various spices, &c., taken with our food.

Effects of a different kind are experienced when inordinate doses of these substances are taken. First there is a sensation of burning in the throat, which extends along the œsophagus down to the stomach; thirst is felt; the natural functions of the stomach are perverted; eructations, nausea, and sometimes vomiting, are observed to occur. When the stimulant arrives in the intestines, it disturbs the natural action of these organs, the peristaltic motion becomes accelerated, and diarrhœa takes place. In the effects produced by stimulants, individual peculiarities, or idiosyncrasy, must also be taken into account. With respect to the effects of diffusible stimulants, on coming in contact with the gastric mucous membrane they are observed to occasion a burning sensation, which extends through the nervous plexuses of the thoracic and abdominal cavities; the muscular tunic of this cavity is made to contract. These immediate effects are different according to the state of the stomach. Before eating, a craving for food is felt; if the individual be after eating, the process of digestion is accelerated. If the stomach be very irritable, or an excess of diffusible stimulant be taken, the digestion is perverted, a feeling of weight and uneasiness is experienced in the epigastric region, the countenance becomes flushed, the head heavy, &c. Large potations of alcoholic liquors, indulged in for a considerable time, produce loss of appetite, disgust for food, eructations, and other dyspeptic symptoms. Diffusible stimulants produce the same effects in the intestines as in the stomach.

Pathological state.—When the parietes of the stomach and intestines are attenuated and atrophied, the effects of stimulants are, in general, less striking. Still, even in this case, they excite the languid appetite, facilitate and accelerate chylification, prevent the unpleasant symptoms which sometimes accompany digestion in such cases, and remove constipation. Where the stomach and intestines are hypertrophied, the power of stimulants is very great; they are then observed to render the appetite voracious beyond measure.

Irritation of the stomach renders it still more sensible to the action of stimulants. The phenomena indicative of this state, as redness and dryness of the lips and tongue, thirst, a feeling of heat and uneasiness in the epigastrium, flatulence of the stomach, eructations, a disposition to vomit, debility, &c., then become more marked. These effects, but in a higher degree, follow the ingestion of stimulants, if the stomach be the seat of inflammation or ulceration. If a schirrous or cancerous tumor exist in the stomach, and such tumor is still covered by the gastric mucous membrane, the ordinary effects follow the employment of stimulants; but if the cancer be open and ulcerated, then a feeling of intense heat is produced; the morbid secretions of the ulcerated surface are increased; the inclination to vomit becomes more frequent and more distressing; the patient complains of the presence of a consuming fire in the epigastric region, as also of a sense of tearing at the same time; he remains for a considerable time in acute pain and great exhaustion. These effects either immediately follow the employment of stimulants, or are not observed till an hour after, according as the cardiac or pyloric orifice is the seat of the disease. Similar effects are observed to follow when the intestines are the seat of disease.

Organs of Circulation.

Physiological state.—Most stimulants exercise a powerful action on the heart. After their employment the blood contained in the coronary arteries stimulates its tissue and accelerates its action, the contractions of the organ become more frequent, and are performed with unusual energy, impressing more force on the column of blood which passes through the arteries. These canals also appear to participate in the effect of the stimulant; they yield a more tense and firm stroke under the finger. The increased frequency of the pulse under the influence of stimulants is a matter acknowledged on all hands.

The action of stimulants on the capillaries is very marked. We see them occasion congestion in different parts of the body; on the skin these congestions give rise to diaphoresis; on the uterus, to a flow of the menses; on the kidneys, to a profuse secretion of urine. In fact, almost all stimulants possess diaphoretic, emmenagogue, and diuretic powers. Their power on the circulation is so great that they are observed frequently to cause hæmorrhages by the nose, hæmoptysis, &c. The temperature of the body is also increased by the use of these substances.

When the heart and blood-vessels are in a state of atrophy, stimulants possess but little influence on them. But in case of hypertrophy of this organ, or of abnormal developement of the vascular system, the action of stimulants is sufficiently striking. In case of hypertrophy of the left ventricle, the employment of stimulants is followed by tinnitus aurium, weight of head, epistaxis, stupor, congestion of the vessels of the brain, &c. Apoplexy has been known to occur in such cases. If the hypertrophy be seated in the right ventricle, the effects arising from the inordinate impulsion of the heart are produced in the pulmonary organs, distressing dyspnœa, violent fits of coughing, and hæmoptysis, are found to occur.

Respiratory Organs.

Physiological state.—When the system is under the influence of a stimulant, the number of respirations in a given time is increased, a greater quantity of oxygen penetrates the bronchial vesicles, from the atmospheric air tarrying there a shorter time, and being more frequently renewed. The increased energies of the pulmonary organs impart unusual activity to the chemical phenomena of respiration ; the blood circulates more rapidly, and presents itself more frequently to the influence of the air in the bronchial cells ; its arterialization is now more complete and more perfect.

Pathological state.—In bronchitis and pulmonary catarrh, stimulants occasion a dry, distressing cough, and great oppression. In pneumonia, also, all the symptoms are aggravated by stimulants. The same may be said of the effects of stimulants in pleuritis and phthisis.

Some stimulating medicines, as gum-ammoniac, squill, &c., are said to be endowed with *expectorant* properties. Such a property, however, is but conditional ; when the lungs are in their normal state it is never developed ; such a power supposes a morbid state of the respiratory organs. When the mucous membrane of the bronchi has become tumefied, and yields an unusual secretion of mucus, and when the pulmonary tissue has become congested and relaxed, we may easily see how the use of a stimulant will facilitate the expulsion of the mucus accumulated in the bronchial cells. Nor is it necessary to admit the existence of a special property in order to account for this effect ; the expectorating property is nothing but the stimulating power directed to the pulmonary organs in a morbid state.

Urinary Organs.

Physiological state.—The *diuretic* powers of most stimulants are very striking. These substances sometimes drive the blood with so much force into the kidneys, that the sanguineous particles escape into the excretory ducts of these organs ; the urine is observed to be of a red appearance after the use of large doses of stimulants. The colour and odour of the stimulant employed is frequently found in the urine.

Pathological state.—In an *atrophied* state of the kidneys stimulants have but little influence on their secreting functions. When, on the contrary, these organs are become *hypertrophied*, stimulants accelerate their secreting functions, and augment the quantity of their secretion.

In febrile and inflammatory affections the kidneys are very frequently in a state of irritation, and hence their secreting power becomes suspended.

Nervous System.

Physiological state.—Stimulants exercise a powerful influence on the cerebro-spinal apparatus; 1st, by the impression which they make on the nerves of the surface which receives them, and which is extended to the different centres of innervation; and 2ndly, by their being taken into the torrent of the circulation. The action of stimulants on the cerebral hemispheres is very well marked; the perceptions are rendered more vivid by their use; the imagination becomes richer and more brilliant, the ideas succeed each other with increased rapidity, and are more distinct and exalted. With respect to the action of stimulants of the diffusible kind, they are well known to have the power of rendering the senses more acute, to give more developement to the general sensibility, and more vividness to all the perceptions. They elevate the mind, multiply the ideas, heat and inflame the imagination; *fæcundi calices quem non fecere disertum?* It is their simultaneous influence on the cerebral hemispheres, and on the nervous plexuses of the great sympathetic, which brightens up the countenance, makes the eye to sparkle, excites the passions, drives away care, and inspires mirth; *sollicitis animis onus eximit.* It is their influence which lights up courage in the brave, excites an assumption of it in the coward; *in prælia trudit inertem;* and clothes with the flattering garb of reality the objects and aspirations of our fondest hopes; *spes jubet esse ratas.*

Medulla oblongata.—This part of the encephalon it is which secretes the principle received by the nerves, and transmitted by them to the several organs for the purposes of motion, life, and heat. The use of stimulants changes the ordinary state of this important part of the nervous system. They accelerate its functions, and augment the ordinary amount of the principles which they secrete, and endow innervation with unusual powers. The importance of their action will still further appear when it is recollected that it is chiefly directed to the pneumo-gastric nerves, and must consequently develope the vitality of the several viscera to which these nerves are distributed.

Medulla spinalis.—By recollecting the extent of power which this part of the nervous system possesses over the animal economy, we shall be enabled to judge of the action of stimulants on it. The effect of increased vitality in the medullary pulp of the spinal cord becomes perceptible throughout all the organs of the thoracic and abdominal cavity, and especially in the muscles of the trunk and limbs.

We have just now adverted to the moral effects of stimulants on the ganglionic plexuses.

Pathological states.—When the medullary pulp of the cerebral hemisphere is the seat of irritation, denoted by morbid susceptibility, hallucinations, exaltation of the intellectual faculties, perversion of judgment, restlessness, disturbed contractility of the limbs, delirium, &c., stimulants have a tendency to exasperate all these symptoms. Should actual inflammation exist in any part of the cerebral hemispheres, characterised by disturbance in one or more of the senses, by false perceptions, perversion of the judgment, memory, imagination, by some extraordinary expression in the countenance, by convulsive movements, &c., the use of stimulants will serve to give more expression to all these symptoms, and to facilitate the diagnosis of the several lesions, and even to point out their seat. If the brain be in a state of congestion sufficient to induce any degree or shade of coma or stupor, it becomes insensible to, or shows no evidence of, the presence of stimulants, as it does in the normal state; for, so far from being excited, it becomes by the plus stimulus farther oppressed, *unless* there be inflammation co-existing, in which case the stimulus, if it were not to produce apoplexy, would sometimes excite a furious delirium; hence it is necessary to be most cautious in allowing wine with disease of the brain, for it might be increasing mischief without evident effect. There are some slight cases, however, of sanguineous congestion of the brain, which we can easily conceive may be cured by the use of a stimulant; we have often symptoms, such as weight of head, stupor, a sort of indifference to everything passing around, &c., which obviously depend on accumulation of blood in the vessels of the head, entirely removed by a stimulant.

Therapeutical Employment of Stimulants.

In the *therapeutical* employment of stimulants, our first business is to consider whether the indication is to effect a local stimulation, or one which may be extended to the entire system—whether, in fact, we have to treat merely a morbid condition of the digestive functions, or atony or debility of the nervous, vascular, or secretory systems.

When the affection is confined to the *stomach*, and appears to depend on want of tone in the muscular coat, the diffusible stimulants, as ether, alcoholic liquors, the essential oils, &c., are usually selected, more especially if flatus be urgent. The medicines employed for the purpose of expelling flatus from the stomach and intestines were anciently called carminatives.* When flatus accumulates in the alimentary canal, the muscular fibres become so much distended, that they are unable to act with sufficient energy so as to expel the flatus, and hence the pain which attends flatulent colic. If, in this case, a stimulant be given, the excitement it produces in the membrane with which it comes in contact, is extended by contiguous sympathy to the muscular coat, which is thus excited to greater contraction, and thus the flatus is expelled. It is on a somewhat similar principle that alcoholic liquors are taken by some persons to promote the digestion of certain kinds of food. As this palliative effect of a stimulant is but momentary, it is obvious, that in order to remove the atony on which the affection depends, recourse must be had to tonics, or to a combination of tonics and stimulants, the former for the purpose of radically removing the state of atony, and the latter as palliative. For this purpose, a bitter infusion may be combined with some aromatic, the former for its tonic, and the latter for its stimulant properties. Here, however, it becomes necessary to ascertain, whether the symptoms are really produced by atony, or are not occasioned by irritation, or sub-acute or chronic inflammation of the gastric mucous membrane, in which case the stimulating plan of treatment would be decidedly injurious. In forming a diagnosis, the practitioner will be sure to ascertain whether there be pain of the epigastrium on pressure, uneasiness after the ingestion of hot or cold fluids, quickness of pulse, dryness and redness of the tongue, dryness and heat of the skin; the pressure of these symptoms will satisfy him that he has irritation or inflammation to combat.

Persons of a *gouty* diathesis, and others also, are occasionally attacked with excruciating *spasms of the stomach* which are aggravated at intervals, there being no signs, however, of inflammatory excitement. In such cases, the combination of diffusible stimulants and narcotics, or the former alone, are indicated, and must be persevered in, till relief is obtained; in such cases the stimulant proves beneficial by exciting a new action, or making a new impression on the nerves of the organ. The stimulants most applicable here, are ammonia, capsicum, ginger, &c.; the effects of the internal application of these stimulants may be assisted by the external application of stimulants to the epigastrium, which will act as revulsive, and so diminish or remove the spasmodic state of the muscular coat of the stomach.

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* From carmen, *charm*, the sudden relief which they afforded causing them to be considered as *charms*.

In the *irritability of the stomach* which occurs during pregnancy, gentle stimulants may be occasionally found serviceable by the new impression they make on the stomach. The mild stimulation produced by effervescing draughts in these cases often affords considerable relief.

In *constipation*, unaccompanied by inflammation, and where on the contrary, there is considerable torpor of the intestinal canal, the addition of an aromatic stimulant to the cathartic is very useful, by stimulating the muscular coat through its direct action on the mucous coat; it will also prove a corrigent to the cathartic so as to prevent the griping property of the latter, by accelerating its passage through the intestinal canal.

Before the pathology of fevers was so well understood as it now is, the great indication was to obviate the tendency to debility, and with this view stimulants were given in great profusion, even in the early stages. Now, however, when it is known that the great danger in fever arises from irritation or inflammation in some organ or tissue, and that few die from real debility, the practitioner directs his efforts chiefly to prevent irregular action in organs, and to remove irritation and inflammation wherever they exist, and hence he adopts the antiphlogistic plan of treatment; thus the use of stimulants is totally discarded during the early stages, and it is only when the powers of life begin to sink, that the propriety of their adoption is ever even thought of. We know, that in the very worst forms and lowest grades of typhus, there is more or less of local irritation present, often in the intestinal mucous membrane, and that many of the signs of debility are dependent on the depressing influence exerted on other functions by the irritation existing in that part. In the whole practice of medicine there is nothing, perhaps, more difficult than to decide with certainty when stimulants are indicated or admissible in fever. We are told in general to have recourse to them, when the pulse becomes fluttering, the tongue moist perhaps, but with a dark fur, the teeth covered with sordes, the skin bathed in a cold, clammy sweat; or if hot and dry, with accompanying symptoms of debility, with sinking down in the bed, and low muttering delirium, the tongue tremulous, and protruded with difficulty; petechiæ or vibices. But it is impossible to lay down any positive rules to direct the practitioner.

Whenever stimulants are decided on in fever, it should be recollected that their operation is apt to be followed by corresponding depression. They should therefore be given so frequently that the depression has not time to intervene, and in such regulated doses as that they may not stimulate beyond the proper point; if the employment is salutary, they will rather diminish than increase the febrile irritation; but if the febrile symptoms be increased under their use, they must be gradually discontinued.

To sum up what is now the generally-received opinion regarding the employment of stimulants in (typhous) fever, the following cautions and directions may be laid down:—the disease consisting as it does in a congested state of the brain and nervous system, the effects of stimulants, by increasing the action of the heart, must be to augment the injection of the vessels of the brain. "We may," says Dr. Billing,* "understand the risk of stimulating a typhous patient, by supposing that when an important organ, such as the lungs or brain, is inflamed, or even congested, the weak pulse of the typhous state of collapse, during peripneumonia or typhus, may be one of the provisions of nature to allow the parts to recover, as they would during the collapse of syncope produced by bleeding; and, of course, when so important an organ as the brain itself is diseased, (as it is, incontrovertibly, in the typhoid state,) we should be careful how we set the heart pumping more forcibly than necessary. The opposite extreme should not, however, be adopted, and the patient die for want of a spoonful, or even a bottle, of wine or brandy, (for the quantity must be relative, depending on the effect,) if there be real danger of sinking at an advanced period of the disease; and when the rallying point is gained, caution is necessary not to push them too far. There is languor and lassitude in all fevers; but the symptoms of sinking requiring stimulants are, fluttering, weak, soft pulse; cold sweat; lying on the back; respiration oppressed; involuntary dejections. Wine, on the other hand, will not agree whilst the pulse is hard or sharp, and the skin decidedly dry, even when there is subsultus tendinum and prostration. Ammonia should be tried before resorting to wine."

To continue the observations of the same accomplished physician on the propriety of stimulants in (typhus) fever:— "Under these circumstances, the object is to restore the strength of the nervous system; stimulants, however, do not effect this, but, by temporary excitement, tend still farther to exhaust it; a gradual supply of arterial blood can alone suffice for its recovery. Were we even to suppose that the heart were still capable of being stimulated to increased action, it is evident that increased action only tends to overload the congested capillaries of the brain with blood, which, from the congested and adynamic state of the lungs, has been less perfectly arterialized, as is shown by the lividity of the lips, dusky colour of the skin, &c.; oppression of the nervous system is thus increased, and matters aggravated, so that the animal powers necessarily begin to decline. But the heart is not always capable of being stimulated to increased action—it is really weak, in typhus, from deficiency of nervous influence; stimulants may increase its sensibility to the presence of the blood, causing it to make more, though inefficient, effort; so that it struggles against an overload, and thus only becomes exhausted. As stimulants do not give power, but only elicit that which exists, the entire system, and the heart in particular, in typhus, may be compared to a tired horse in a loaded cart reaching the foot of a hill, but unable to ascend it; the stimulus of the whip may make him struggle to the attempt, but, if urged, he will at length sink. If, however, some of the load be removed, he can ascend the hill; and if some of the load of blood be withdrawn, the pulse will rise, as is well known and admitted in its sunken state in severe inflammation of the lungs or bowels, but which is not so generally acknowledged in typhus, where bleeding is, nevertheless, sometimes resorted to, either on account of the fever itself or some of the 'complications' of local inflammation of the head, chest, or abdomen. But again, if the horse, without being either stimulated by the whip or having his load lightened, be allowed to rest, he will be able to ascend; and thus, often without either stimulating on the one hand, or venesection on the other, the heart will recover, and the pulse rise."

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* Op. cit.

What has been said of the impropriety of giving stimulants in fever, applies equally to inflammatory diseases, and all internal inflammations generally. There are, however, a few exceptions. Decided benefit has been derived from the use of copaiba and cubebs administered during the inflammatory stages of gonorrhœa; this, however, is a specific, and not a common inflammation.

In *hypertrophy* of the heart, the use of stimulants is decidedly mischievous, such a morbid condition being generally accompanied by a tendency to hyperæmia of the brain.

In *hysteria* the use of stimulants is frequently found beneficial from the new impression which they produce in the stomach; it is for their stimulant properties that assafœtida, valerian, musk, &c., are so often given in this disease.

In *paralysis* the use of stimulants is by no means free from danger; this affection is frequently induced by a hyperæmic condition of the brain, or of some portion of the cerebrospinal axis; and although the hyperæmia may have disappeared, stimulants, incautiously given, may cause its recurrence, and thus occasion another attack. In some cases, however, the external application of stimulants has been occasionally beneficial; such as electricity, galvanism, moxa, and frictions.

In a few cases the nux vomica, and more especially its active principle strychnine, has been given with partial success. When this substance has been used for some time, it is found to occasion tetanic convulsions in the muscles to which the paralysed nerves are distributed, and accordingly seems well adapted for exciting a salutary stimulation.

In some cases of topical inflammation on the surface of the body, and more especially affecting the skin, the application of local stimulants has often proved of undeniable advantage. "The agents commonly called local stimulants," says Dr. Billing,* "have an effect analogous to heat; for though, in excess, they expend the nervous influence too rapidly, so as to produce inflammation of a sound part, in moderation they are highly useful in some cases of local inflammation, where the nerves are languid; while general (diffusible) stimuli, which produce intoxication and raise the pulse, would be injurious, as we see exemplified in the effect of capsicum in quinsy and scarlatina, in which it is highly beneficial to the mucous membrane as a gargle, or swallowed, when wine would aggravate the accompanying fever, as well as the inflammation, by increasing the *vis a tergo.* This distinction is not in general sufficiently understood or acted upon, and is the reason why students cannot understand how cubeb pepper cures leucorrhœa, gonorrhœa, &c., in which the capillaries of the part are in a state of relaxation."

It is on this principle we expose a part that has been burned to the action of heat, and that we employ capsicum and other stimulating gargles in sore throat, and stimulating collyria in chronic inflammation of the eye. In inflammations of the dermoid system, cutaneous or mucous, the over-distended state of the capillary vessels predominates over the excitation of the blood-vessels communicating with it, that the capillaries are in a state of asthenic hyperæmia, which occasions the motion of the blood through them to be retarded, and sometimes absolutely stagnated. Anything, therefore, which will stimulate the over-dilated capillaries to resume their wonted calibre, will remove the cause of the excited state of the vessels communicating with them, and will, consequently, put a stop to the inflammation.

In *toothache* stimulants, such as oil of cloves, are introduced with benefit into the hollow of the affected tooth.

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* Op. cit. p. 138.

Stimulants are used with singular advantage by surgeons for the purpose of inducing a new action in *indolent ulcers*, and for arousing the action of the absorbents.

To the class of mental stimulants belong certain emotions of the mind, whose influence on the system is not less marked than that produced by physical agents. The beneficial effects which the stimulation of joy, hilarity, and its usual accompaniment, laughter, produces on the invalid, are duly appreciated. Care, however, must be taken not to allow the patient to be led into imprudence by buoyancy of spirit, or to indulge in mental excitement to excess. This caution is more particularly necessary in cases where there may be a tendency to irregularity of nervous or vascular action, or in cases of fever, or in the state of irritability which oftentimes is observed in women for days after delivery.

If the physiology of laughing be but considered, it will at once appear how injurious it may be, when immoderately indulged, to persons predisposed to apoplexy, or in the case of hysterical patients; where, on the contrary, the functions of the abdominal viscera are slow and torpid, or where the secretions from the liver are not duly performed, moderate laughter may be a useful agent.

Violent mental emotions, as passion or rage, are particularly to be guarded against by those predisposed to apoplexy, as also by those who labour under chronic diseases of the heart or lungs.

TONICS.

Tonics are defined to be agents which give strength and igour to the system. They do not, like stimulants, call forth ction, nor, like sedatives, repress it, but give power to the ervous system to generate or secrete the nervous influence by which the whole frame is strengthened.* According to some, medicines of this class exert their specific action on the muscular system.

The only way, according to Dr. Dunglison, in which these agents can act on the muscles, is on their contractility, like excitants, and indirectly on their nutrition, through the medium of the nerves distributed to the stomach ; the irradiation being conveyed from thence to every part of the nervous system, and, therefore, to every portion of the frame endowed with nervous influence.

The same writer justly observes that want of tone seems to depend more, in the majority of cases, on exhaustion of muscular contractility, and on impaired nervous influx, than on any other mechanical alteration in the condition of the muscle, and adduces general facts from physiology and pathology in support of this opinion. Thus, the common feeling of many persons is so much influenced by the condition of the atmosphere, that they become almost barometers ; feeling light and buoyant when the air is clear, and dense and gloomy when it is moist and light. Again, should the bowels be loaded, the powers of the system will be quite oppressed, there will be a feeling of languor and lassitude, and the individual so affected becomes incapable of the slightest muscular exertion ; as for instance, if a man, previously in health, be struck with the contagion of malignant fever, he finds his strength dissipated, and that he is unable to raise as many ounces with the flexor muscles of his arm, as he could a short time previously raise pounds. Now in none of these cases can it be supposed that the mechanical condition of the muscle is changed. With respect to the vicissitudes of the atmosphere, the loaded bowels, and the impression of malignant fever, the feeling of debility must be considered as entirely dependent on the nervous system. The extraordinary feats of strength which the maniac is able to perform, is a striking proof, how closely the state of muscular tonicity is connected with the nervous system. In cases of this kind we occasionally find the delicate muscles of the female executing feats, which the well-developed muscles of the male would be unable to perform under the ordinary share of nervous influx. The action also of what may be called mental tonics, and of which we shall speak presently, must evidently be exerted on the brain in the first instance, and through the medium of the nerves on the rest of the body.

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* Billing, op. cit.

Tonics may be either direct or indirect : that is, they may either directly add to the healthy tone of the system ; or in particular conditions of the economy, other substances belonging to different classes of therapeutical agents, may indirectly produce a tonic effect. Thus blood-letting, cathartics, &c. may prove indirectly tonic.

Effects. When a tonic is administered in disease, its effects are gradual and almost imperceptible, and this constitutes one of the chief points of difference between tonics and stimulants proper. They produce, in fact, no sensible evacuation. By their employment the appetite for food becomes gradually improved ; the morbid impressibility of the nervous system, often induced by long-protracted indisposition, or by a rapid reduction of the vital forces, as in acute disease, is removed, the action of the capillaries over the whole system becomes augmented, and the function of nutrition is invigorated ; the general feeling also becomes buoyant and elastic, and the muscular powers, under the improved nervous influx, are restored to their pristine state. Hence, the great use of tonics in convalescence.

Bitter extractive is considered to be the great tonic principle of most of the vegetable tonics ; this is sometimes accompanied by an aromatic oil, which renders the tonic more stimulating. It appears to pass through the system without suffering any change in its nature, or diminution in its quantity. No cattle will thrive on grasses which do not contain a portion of this vegetable principle. Mr. Sinclair, in his work entitled "HORTUS GRAMINEUS WOBURNENSIS," has shown that sheep fed on yellow turnips, which contain little or no bitter principle, become diseased and die, unless they can obtain some provender which may contain it, and which they instinctively seek for. The presence of the bitter principle in malt liquors is productive of considerable advantage, as it not only tends to diminish their injurious effects by counteracting the stimulation and subsequent debility occasioned by them, but also contributes to render them, when used in moderation, promoters of digestion. "With regard to the natural use of bitter extractive, it may be laid down as a truth," says Dr. Paris, "that it stimulates the stomach, corrects putrefying and unwholesome nutriment,—promotes tardy digestion,—increases the nutritive powers of those vegetable substances to which it is united,—and furnishes a natural remedy for the deranged functions of the stomach in particular, and through the sympathetic medium of that organ, for the atony of remote parts in general; . . . . it certainly imparts additional activity to many remedies, while it renders the stomach and system more susceptible of their salutary energies." The same writer attempts to account for the tonic powers of the nitrate of silver by attributing them to its bitterness. Analogy, however, derived from more than one source, affords us a readier and much more probable method of accounting for the tonic effects of this substance. Other metallic preparations, as arsenic, sulphate of copper, bichloride of mercury, which, moreover, agree with nitrate of silver in their action on sores on the external surface of the body, are also known to possess tonic powers, for which they are indebted to their influence on the nerves, and then on the capillaries. To the same influence we may reasonably refer the tonic effect of nitrate of silver.

Tonics are prescribed in medicine, either for the purpose of breaking in upon a chain of morbid phenomena which occur in paroxysms, as in intermittent fever ; or in order to remove debility by their slow but permanent operation. In the former case the lignine or woody matter of the vegetable tonic may not be objectionable ; but in the latter, where the powers of the system in general, and more especially of the digestive organs, have been prostrated by long-protracted disease, the vegetable tonics cannot be always safely administered in the form of powder ; in such cases the aqueous infusion may be resorted to ; or, what is still preferable, the active principle of the vegetable tonics separated from the other principles which accompany it ; of which modern chemistry has afforded us instances in the cinchonine and quinine. Where from the nature of the case it becomes necessary to continue the use of the tonic treatment for any length of time, it is advisable to vary the tonic, as the system soon becomes habituated to the same agent. The action of tonics seems to be direct on the nervous system. This has been shown to be the case with quinine, iron, and arsenic, in neuralgia. That tonics, like many other classes of medicine, are but relative agents, is evident from the fact that stimulants sometimes are found to produce a tonic effect by their imparting to the digestive organs an increase of power for the moment, and so enabling them to extract the aliment from the food ; and thus, as Dr. Billing says, " stimulants and generous diet become a part of the tonic plan." From this circumstance some have inferred the converse of the above proposition, and take it for granted that because stimulants are sometimes tonic, tonics are stimulant, an inference likely to lead to very injudicious practice on many occasions. "Tonics, being intrinsically neither stimulant nor sedative, may be usefully combined with either; for whether we want to keep down the pulse in inflammation, or to raise it and the appetite, &c., in debility, it must obviously be desirable to give tone and strength to the nervous system at the same time; because tone and strength of the nervous system will not increase the action of the heart unless it be called forth by stimulants. We must observe this difference: tonics give strength, stimulants call it forth: a man may be very strong without putting forth his strength.* With respect to the modus operandi of tonic substances, whilst some of them, chiefly from the vegetable kingdom, are known to exert their peculiar power immediately and directly on the primæ viæ, the chief of them, and, indeed, all those derived from the mineral kingdom, are acknowledged to produce their effects after being taken into the circulation, and then acting on the nerves, and through them on the capillaries.

It may not be uninteresting to run through each of the systems of the body, and to note the changes made in their action by the exhibition of a tonic. We shall thus be enabled to form a just idea of the importance and extent of the properties of this class of medicinal substances, and to see what advantage therapeutics may derive from their employment. We shall commence with the

DIGESTIVE APPARATUS,

and first consider how it may be affected in its healthy or

Physiological state.—Observation demonstrates, that after the exhibition of a tonic medicine, the coats of the stomach experience a fibrillary contraction, whereby they become more firm and more compact, and the stomach in a manner contracts on itself. We are equally warranted in supposing, that according as the substance advances into the interior of the intestinal canal, a similar effect is produced on its coats. The exhalations, and several secretions which ordinarily moisten the mucous membrane of these parts, are suspended. The impression made on this membrane is communicated to the muscular tunic, the fibres of which become contracted: in consequence of this change the body of the intestine becomes harder, firmer, and more resisting, whilst its cavity is at the same time diminished. The changes observed in the function of digestion, after the exhibition of a tonic, points out that its influence on the organs subservient to this function is to strengthen their tissue and augment their vigour. We see tonics given in a small dose increase the appetite and bring it on sooner than usual; several individuals find their digestion facilitated and expedited by their employment; a digestion, habitually languid and difficult, by reason of debility of the digestive organs, is rendered stronger and less distressing after the use of a tonic. It may be observed, that the alvine evacuations acquire an unusual degree of consistence from the employment of tonic medicines, and sometimes appear diminished in quantity. This may be accounted for by the increased degree of absorption along the intestinal surface, whereby the residue of digestion is deprived of its liquid parts.

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* Dr. Billing, op. cit.

When tonic substances are taken in very large quantities into the stomach, they produce considerable disturbance in the functions of the digestive organs. They excite a sensation of heat in the epigastrium, which is diffused over the abdomen, is propagated to the chest and to the head, and is even felt in the limbs. When the substance has entered into the intestines, these become distended and swollen by the exhalation of gas, whilst the muscular fibres are affected with spasmodic contractions, giving rise to colicky pains.

Sometimes, however, we may perceive tonic medicines produce liquid and even abundant dejections. From having observed this result, Cullen considered himself warranted in placing bitters under the head of purgatives.

Pathological state.—When the stomach or any portion of it is in a state of irritation, the exhibition of a tonic substance disturbs the action of this organ, and perverts the regularity of its functions. Irritation of the stomach manifests itself by redness and dryness of the lips and tongue, by the smallness and diminished appearance of the latter organ, by thirst, sensibility of the epigastrium, &c.; these symptoms are all aggravated by the use of tonic medicines. If the stomach, instead of mere irritation, is actually inflamed, the exhibition of tonics will give rise to phenomena still more striking; their use is followed by a painful sensation of heat in the epigastrium, which the patient compares to a consuming fire, by swelling of this part, with great pain on pressure, great thirst, anxiety, oppression, and different other phenomena presented by the organs of circulation, respiration, by the brain, &c.

The coats of the stomach sometimes undergo a morbid change, which gives them a softened appearance, which change causes great debility in the powers of this organ: there is anorexia, a dislike of mucilaginous or fatty aliments; in such cases the use of tonics has the most happy effects; they re-establish the natural functions of this viscus, by inducing a more free and easy digestion.

If the tissues of the stomach are hardened, if scirrhus or cancer occupies any portion of it, the effects of tonic medicines cannot be determined beforehand. They vary according as these lesions are situated towards the cardiac or pyloric extremity, near the great or small curvature of the stomach. In such cases tonics have occasionally afforded temporary relief, by retarding the vomiting, and diminishing the frequency of the sour eructations which so often accompany such affections, and by inducing a desire for food, which previously had not existed.

The action of tonics on the intestines in disease merits particular attention. When the mucous membrane is in a state of irritation, the exhibition of tonics will have the effect of exasperating the disease. Should inflammation exist in these parts, the effects of tonics will be still more intense. When blood is exhaled from the mucous surface of the intestines, a tonic may have the effect of arresting the hæmorrhage. If this happens to be at the same time the seat of ulcerations, as is seen in dysentery, the effects of tonics will no longer be certain: they will vary with the pathological condition of the intestinal surface.

In wasting of the intestines, which is often observed in the examination of dead bodies, and which is, in general, the result of long-protracted disease, in addition to the diminution in substance, there is usually great irritability, and consequently frequent alvine evacuations, whereby the aliment is carried off by stool previous to its complete elaboration. In such cases tonics may be of advantage, by assisting the function of digestion, and rendering the stools more regular.

If ulcerations exist on the surface of the intestines, the effects of tonics will be found to vary according as these are observed to be of an old or recent date, superficial or deep-seated, and according to the state of the ulcerations. If these be recent, tonics may, by developing the vitality of the parts, bring on cicatrization; should inflammation accompany them, tonics may have the effect of exasperating the case. It is necessary to observe, that ulcerations seated on the large intestines cannot be much influenced by tonics taken by the mouth, inasmuch as their active principles are almost all absorbed in the small intestines, before they can reach the large. The best mode of applying tonics in such cases is by injection.

It often happens that the stomach and intestines are affected only in their vitality, without their tissues experiencing any structural or organic lesion. This arises from the increased, diminished, or irregular distribution of nervous influence to these parts. The origin of such affections may be referred either to the brain, whose influence on these tissues of the stomach and intestines is changed, or to the nervous cords received by these parts. If the nervous influence be increased, the digestive organs become more than ordinarily sensible; digestion itself causes the sensation of weight and of painful tension. If it be irregular, there appears a crowd of phenomena, such as spasm, colic, sudden swelling of the intestines, pains communicating with the vertebral column, vomiting, &c. If the nervous influence be diminished, we observe want of appetite, languid or imperfect digestion, diarrhœa, &c. In the two first cases tonics will but exasperate the affection; whilst in the latter they will, if taken in moderate doses, regulate the digestive function; a result, no doubt, depending on the influence of the tonic on the nerves of the stomach and intestines.

Tonic substances, though not coming in immediate or direct contact with the other parts of the digestive apparatus, as the liver, pancreas, and spleen, may, however, act on those organs: 1. By that sympathy which the nervous plexuses established between all these parts; 2. by the entrance of their molecules into the circulation; 3. by the contiguity of the intestinal tissues to these organs. The liver is, more than any other organ, subjected to the action of medicinal substances. In a healthy state the action of tonics has no appreciable effect on it; but when in a state of irritation or inflammation, the exhibition of a tonic never fails to exasperate all the symptoms. Bilious vomiting may be the consequence: the inflammation will often spread to the other parts of the abdominal cavity, particularly to the stomach and intestines. If there be a diminution in the volume of the liver, tonics will excite the action of nutrition, and they will concur in restoring to it its natural or physiological dimensions. This morbid state of the liver is very common; it arises directly from the languor in the assimilating functions of this viscus, or may proceed from an inordinate absorption, which carries away the materials belonging to its substance: this change may take place at the end of acute disease, in which the liver has been somewhat inflamed. We sometimes meet with the liver very much enlarged; in such cases the vitality of the organ being inordinately developed, an excess of bile is secreted; a reflux of which into the stomach brings on bilious vomiting. The skin assumes usually a yellowish tint. When such an affection exists, tonics augment it, by increasing the already too great assimilating powers of this organ, and exciting still more the secretion of bile.

CIRCULATORY ORGANS.

Physiological state.—Tonics influence the organs of circulation in two ways: when taken into the stomach, the impression made by them on the nerves of that viscus is continued to those of the heart, and this sympathy may change the action of this organ. But it is by the molecules of these substances being taken into the circulation, and thus coming in immediate contact with the substance of the heart and arteries, that the organs subservient to this function are principally influenced. When a dose of a tonic medicine has been taken sufficient for its influence to become general, it is easy to perceive that the contractions of the heart are performed with greater energy, and that this organ propels the blood with greater force into the blood-vessels: the coats of the arteries also become more resisting and more rigid; the pulse becomes firmer and harder, and vessels appear under the finger diminished in size, and at the same time more tense. It is at the same time worthy of remark, that the course of the blood is not quickened, it being one of the characters of a tonic to strengthen the organs without accelerating their action.

It is necessary to distinguish the effects of a tonic medicine arising from the impression of its molecules on the tissues of the heart and arteries from those which do not appear until after a long-continued use of this substance. Thus, one dose of a tonic will render the pulse either more full or more frequent, but after the continued exhibition of this substance for some time, it will assume all these characters; these changes will be referrible to the change made in it by the function of nutrition.

Pathological state.—When in febrile diseases the pulsations of the heart are become more quick than ordinary, and its contractions stronger and more rapid, and the pulse at the same time is accelerated, it is natural to suppose that these organs are in a state of irritation, whether this irritation arises from the sympathy between the heart and any other part of the system which may be diseased, or from a direct affection of the heart itself. This state of irritation in the organs of circulation presents itself in a great number of diseases. The effects of tonics under such circumstances are sufficiently obvious: when to a patient with a quick, frequent, and hard pulse, burning heat and dryness of the skin, a tonic is given, we uniformly find all the symptoms exasperated after each dose, the pulse is redoubled in force and frequency, the heat becomes more oppressive; presently there come on anxiety, restlessness, &c. If any organ be in a state of inflammation, observation shows us that the exhibition of a tonic never fails to heighten and extend the disease, the capillaries of the inflamed organ being irritated by its particles. From what has been stated, it is unnecessary to detail the mischief which would result from the administration of tonics, when the organs of circulation are in a state of actual inflammation.

In hypertrophy of the ventricles, particularly of the left, tonics render the pulse stronger and quicker, and the beating of the heart more violent, and never fail to augment the cerebral disturbance, as well as the other symptoms usually accompanying this affection.

In atrophy of this organ, tonics render the pulse stronger for a time, and the pulsations of the heart itself more sensible. This state of the organ is frequently observed in convalescence from fever, during which the tissue of the heart may undergo considerable modifications, its function of nutrition being interfered with during the progress of the disease.

The functions of the heart may be perverted independently of any structural lesion. This may be attributable either to the excessive or deficient supply of nervous influence. In the former case there will be violent palpitation of this organ, and great irregularity in the pulse ; in the latter the action of this viscus will be slow and weak, as will also the pulse. In the one case tonics will generally exasperate the symptoms, whilst in the other they may prove serviceable.

With respect to the action of tonics on the ORGANS OF RESPIRATION in their *healthy state*, little can be said either interesting or important. But when any part of these organs happens to be the seat of inflammation, whether their mucous membrane, as in bronchitis, or their parenchyma, as in pneumonia, or the pleura, the exhibition of tonics will be found invariably to exasperate all the symptoms. In hæmoptysis tonics may serve to constringe the capillaries of the bronchial membrane, and thereby put a stop to the evacuation ; but in such cases the injudicious use of this class of medicines may do much harm.

The action of tonic medicines on the BRAIN and its appendages, in their *physiological state*, is by no means striking. But when this organ or its membranes are in a state of irritation or inflammation, we invariably find medicines of this class considerably to augment all the symptoms. When the arachnoid is inflamed, the exhibition of a tonic exasperates the acute headache accompanying such a state, as also the restlessness, delirium, intolerance of light and sound, &c. In the course of febrile disease, the spinal arachnoid is often the seat of irritation, giving rise to symptoms which are developed in the chest, abdomen, and in the limbs. There is pain in the neck, between the shoulders, along the back, in the loins, according as the irritation occupies one or other of these regions. In such cases the use of tonics will do considerable mischief. The cerebral mass itself may be affected either by congestion, effusion, or actual inflammation. The former state is oftentimes induced by the use of tonics in febrile diseases. It is unnecessary to state, that in all such affections medicines of this class are entirely contra-indicated.

The substance of the spinal cord may also experience several sorts of lesions: from its intimate connexion with the system of the ganglionic nerves, or with the trisplanchic nerve, it becomes impossible to distinguish the affections peculiar to each of these two important parts of the cerebral apparatus. From the circumstance of the spinal cord and ganglionic system of nerves, holding all the viscera under their control, it comes to pass, that lesions of these parts manifest themselves in different parts of the system, by disturbing organs which are perfectly sound. Thus, spasms of the œsophagus, difficulty of deglutition, palpitation of the heart, cramps of the stomach, colics, &c., oftentimes arise by no means from any lesion of the parts where these symptoms are developed, but from a lesion of the spinal cord or ganglionic plexuses. Convulsions, shaking of the limbs, Saint Vitus' dance, oftentimes depend on irritation of the spinal cord or its membranes. Hysteria and epilepsy have their original frequently in the cord.

The substance of the spinal cord may likewise be the seat of disease: there is then manifested great disturbance in the functions of respiration, circulation, and digestion, so that one might refer the disease to the thorax and abdomen, and not to the cord itself. Organic disease of the heart has been frequently suspected, from the disturbed and irregular action of this organ, where the spinal cord was really the seat of disease. It is to be observed, as before, that in all cases of irritation of the cord, tonics are contra-indicated.

Besides these structural affections of the cord, it is also subject to what may be considered vital lesions. Thus, weakness in the heart's action, in the functions of the stomach, of the intestines, and of the lungs, may exist without the tissues of these viscera presenting the least alteration, and are to be referred to a diminution in the quantity of the nervous influence distributed to those parts. In such cases tonics will prove serviceable, as well by exciting the vitality of these viscera, as by stimulating the spinal cord to resume its natural influence over them. It is in this way, no doubt, that tonics act when given to remove weakness of the stomach, loss of appetite, slow digestion, weakness of pulse, &c.

THERAPEUTICAL USE OF TONICS.

With respect to the *therapeutical employment* of tonics, it may first be observed that in the treatment of *febrile diseases* they are now seldom required. In the treatment, however, of malignant fevers, where typhoid symptoms supervene, advantage will often be derived from their judicious employment.

In the treatment of intermittents, and indeed of all diseases characterized by periodicity, tonics are our sheet anchors. They seem to act beneficially in these cases by making a new impression on the nerves of the stomach, and through them on the nervous system generally, which new action breaks in upon the morbid chain previously established. This theory of their action seems to be borne out by the fact that a strong mental emotion has occasionally produced the same effect as the tonic, by preventing an expected paroxysm, and removing it after it had commenced. Thus, fear has acted as a febrifuge, and in the same way probably we may account for the effects sometimes produced by the animal magnetizer.

This effect of mental emotion, as well as of tonics in general, on the system in the case of intermittent fever, seems rather irreconcilable with Broussais' views of the pathology of this affection, viz., that " every regular paroxysm of an intermittent fever is the sign of a gastro-enteritis, the irritation of which is afterwards extended to the cutaneous exhalants, which produce the crisis." It should always be kept in view by the practitioner, that it is only when the apyrexia is complete, tonics can be administered with perfect safety, and with full advantage in the treatment of intermittents. If any organ be in a state of hyperemia, such state must be removed before the tonic medication can be commenced, unless perhaps in those old obstructions of the parenchymatous viscera, which occasionally present themselves as evidences of former attacks of malarious diseases. In the pernicious intermittents also, which prevail to so great an extent in some countries, as in Italy and some parts of America, the bark seems to be required before there is a complete apyrexia, for the purpose of arresting as soon as possible those paroxysms which might prove fatal by occasioning asthenic hyperemiæ in important viscera.

It may be laid down as a general rule, that before the tonic medication is commenced, all topical mischief should be first removed, such as enlargement of the spleen, fulness or obstruction in the liver, &c.; as the existence of such states has a tendency to counteract the sanative influence of tonic remedies on the morbid catenation which keeps up the fever.

With respect to the treatment of *remittent fevers*, the same rule may be observed regarding the use of tonics, as has been laid down in reference to continued fevers. The nearer the remittent approaches to the form of an intermittent, the more beneficial will the action of tonics prove. While inflammatory symptoms exist, indicating a hyperemic state of any organ, antiphlogistics should be employed exclusively. There are cases, however, of remittent fever occurring in malarious districts, which do not assume a highly inflammatory character, and which call for the use of bark comparatively early, in order to prevent those engorgements of internal organs, which so frequently occur in this disease, unless it be interrupted in its progress at an early period. However, all evidences of vascular excitement and topical engorgements should be removed, before tonics are administered.

With respect to the treatment of *inflammation* in general, tonics have been found beneficial by the energy they impart to the capillaries of the inflamed part, and this even when antiphlogistic measures may be required to keep down the action of the heart; this is more strikingly exemplified in the treatment of erysipelatous and rheumatic inflammation. Those substances, however, usually arranged under the head of tonics, and which at the same time are found to possess stimulating properties, should be avoided as long as the action of the heart is above par. When, however, the acute stage of inflammation has been subdued by depleting measures, by which the powers of the system may be so much reduced that the process of reparation cannot go on, then it is we are called on to administer tonics.

Medicines which usually pass under the name of alteratives have been classed by Dr. Billing under the head of tonics; such, for instance, as mercury, arsenic, mezereon, colchicum, &c. The chief and most interesting of these substances is mercury, so much resorted to for the cure of inflammation, and that merely on empirical grounds, its mode of action not being generally understood even by those who use it most. From its efficacy in curing inflammation with equal success, both in strong and in debilitated habits, this writer considers it neither stimulant nor sedative, but strictly tonic; that is, he says, "by its specific action on the capillaries, whether directly on their tissue or through the medium of their nerves, it causes them to contract, when (though all the injecting force of the heart were taken off by sedative treatment) they would not have had power to close; for when introduced into the system, it circulates to the capillaries, and gives them tone to contract, analogous to the effect of an astringent applied to external sores." The same may be said of arsenic, colchicum, nitrate of silver, iron, &c.

The following practical remarks from the same writer on the use of tonics in the cure of inflammation, more especially in broken-down constitutions, are too valuable to be omitted:— "the varieties of inflammation may be understood by always recollecting that the heart is acting against the arteries, and that both heart and arteries derive their power from the nerves. Thus inflammation may go on when the pulse is very weak, and when the heart is acting much more feebly than natural; but the arteries, being even weaker in proportion, give way, as we see in broken-down constitutions, where inflammation is cured by stimulants, which raise the pulse, but which, at the same time, by improving the appetite and digestion, nourish and increase the energy of the nervous system, so as to communicate to the capillaries a tone or power to resume their healthy action, more than equivalent to the increased action of the heart. In some cases, by good food and tonics, such as bark, without stimulants, we communicate an energy to the nervous system which restores the healthy action of the capillary arteries; and it is the discrimination of cases where stimulants are admissible with tonics, or where tonics should be accompanied with evacuants, that constitutes skill in conducting the constitutional treatment of many diseases."

In *erysipelatous inflammation*, some have recommended the use of tonics in every stage. A great deal, however, must depend on the habit of the patient, and on the climate or locality in which the disease may occur. Should the inflammation be attended with typhoid symptoms, the use of tonics is obviously indicated: in fact, when a tendency to gangrene manifests itself, the tonic and even stimulant medication becomes our sheet-anchor. The same remarks may be made with respect to *acute rheumatism*. We have, however, in another part of the work, spoken of the method of treatment with opium. In general, it may be remarked, with respect to the treatment of acute rheumatism, that though the disease be an inflammation, it is still an inflammation sui generis, not one to be knocked on the head, like pleuritis or pneumonia, by large and repeated venesection and other antiphlogistic treatment; nay, we know from practical experience, that such treatment, injudiciously employed, has been productive of the worst consequences, such as metastasis to the heart, and its envelope, &c.

In the treatment of *hæmorrhage*, more especially of the passive kind, the employment of tonics may be resorted to with advantage; but in the inflammatory form of hæmorrhage, their use is contra-indicated precisely for the same reason as in sthenic inflammation. In scurvy, and where a passive hæmorrhagic tendency shows itself, such treatment has been found serviceable.

In the treatment of many of the *neuroses*, where there is considerable debility and mobility of the nervous system, the tonic plan of treatment may be employed with great advantage—this holds good of epilepsy, which depends more frequently on the condition of the nervous system, than on any inflammatory state. Where, however, the disease depends on organic lesion, the use of tonics cannot be expected to produce benefit. With respect to the tonics to be employed in such cases, those derived from the mineral kingdom have decidedly the advantage, more especially the nitrate of silver; in order, however, to be useful, its use must be persevered in for a considerable length of time. The preparations of zinc, copper, and iron have been employed in the same affection, but not with so much efficacy as the nitrate of silver.

In the treatment of *chorea*, the use of tonics, combined with cathartics, for the purpose of obviating the torpid state of the bowels which usually characterises this disease, has been found of decided advantage. In these cases, also, the mineral tonics are preferred.

In *chlorosis*, in which there exists great torpor of the system, characterised by pale and lurid complexion, languor, listlessness, loss of appetite, dyspepsia, palpitation, &c., tonics are indicated.

In *neuralgic* affections, characterised chiefly by a very acute pain, exacerbating or intermitting, which follows the course of some nervous branch, extends to its ramifications, and appears therefore to be seated in the nerve, the tonic medication has been found very satisfactory, and the preparations of iron have proved particularly useful. In one form of this disease, the *tic douloureux*, the sesquinitrate of iron has been represented to be extremely serviceable. The carbonate of iron in large doses has been found beneficial, when continued for a considerable time.

In the *dysuria* which is often an accompanying symptom of hysteria, the muriated tincture of iron is very much extolled for its spasmodic virtues; when employed for this purpose, it should be given in the dose of ten drops every quarter of an hour.

In the case of *worms* the tonic medication is extremely beneficial. Tonics from the class of bitters, as being considered unfavourable to the generation of entozoa in the body, are those most used.

In *chronic cutaneous affections* unaccompanied with fever, as in some varieties of strophulus, lichen, porrigo, &c., tonics may be employed with advantage. Their beneficial effects Dr. Dunglison supposes to depend on the changes they induce in the blood, and, through that fluid, on the vessels of the affected parts.

Where *gangrene* is about to take place in any part of the body, the surgeon derives great advantage from the employment of tonics administered internally, as well as applied to the gangrenous part where this is practicable. The quinine is that which is found most beneficial in such cases.

As a general principle it may be laid down, that where the *powers of the system are considerably reduced,* or where the action of the *nervous system* is much *impaired;* when the pulse is weak, the skin pale, and where the symptoms of cachexia are present, the use of tonics is indicated. In certain forms of pneumonia, where the disease assumes the typhoid character, stimulating tonics, such as decoction of polygala, are found eminently serviceable in producing resolution of the pulmonary congestion, either by directly stimulating the coats of the pulmonary vessels in their passage through them, or by their exciting the powers of the nervous system.

Cold bathing is also set down as a tonic; if, however, we consider the matter physiologically, it acts rather as a direct sedative. The truth however is, that the effects of the cold bath vary according to the manner in which it is applied, and the state of the system in the individual who employs it. The effects sought from the employment of the cold bath as a medical agent, are—1. The shock on the nervous system, independent of the accompanying refrigeration or subsequent reaction; 2, the refrigeration, independent of the shock or the reaction; 3, the reaction independently of the shock or refrigeration.

When the *shock* is the end for which the cold bath is employed, the temperature of the water must be low, and the immersion sudden; the patient also must be immediately withdrawn: if the application be in the form of cold affusion, the water must be dashed over him. This form of using the cold bath is sometimes resorted to in nervous and convulsive diseases.

When the object is to obtain the refrigeratory effect of cold bathing, with as little shock or reaction as possible, the temperature should not be too low, nor the application sudden or violent. The cases in which it is desirable to obtain this effect, are those in which the animal temperature is raised considerably above the natural standard, as in febrile diseases; in symptomatic fevers, arising from visceral inflammation, this remedy is seldom applicable. To ensure refrigeration, the water should be applied at first only a little below the temperature of the skin, its heat being insensibly and gradually reduced, but never below the tepid or cool temperature. The gentlest mode of application is the best, nor should any interruption take place till the desired effect is obtained.

Sometimes the secondary effect, reaction, is the end proposed in using the cold bath, and this is by far the most important object for which it is employed. We shall therefore consider the circumstances which obstruct or favour its production.

1. The degree of reaction is, *cæteris paribus*, proportioned to the coldness of the water, and also to the suddenness and force with which the cold bath is applied.

2. The reaction is proportioned to the vigour of the circula-

tion, and more especially to that on the surface ; also to the warmth of the skin previously to immersion. Hence, persons with a feeble circulation and cold extremities should increase the temperature of their body before taking a cold bath. Exertion in the bath, by swimming for instance, will also increase the reaction. Whatever also prevents the temperature of the surface from falling below the proper degree, or directly stimulates the skin, or excites the heart's action, will proportionately increase the glow. Thus drying the body immediately, strong friction of the surface, drinking warm fluids, active bodily exertion, all increase reaction.

Cases in which cold bathing may be employed; and the contra-indication to its use.

The employment of the cold bath requires great caution and discrimination ; first, as to whether it should be used at all ; and next as to the form or mode of using it.

One of the most important class of cases wherein the cold bath is beneficial, consists of the various forms of constitutional debility which occur in childhood and youth. The strumous habit may be selected as an example. In such cases the cold sea-bath is frequently very beneficial. Great caution, however, must be exercised here, as it is well known that children of a strumous habit have but feeble powers of circulation, and a very sensitive surface ; the consequence of which may be, that the shock may be too powerful for the energies of the system, and may not be followed by the necessary degree of reaction. The precaution already given for ensuring reaction should be here attended to. Before using cold bathing, care should be taken to see that visceral disease exists.

As a preventive of the many diseases produced by cold or by variations of temperature, cold bathing is of prime importance; 1st, by acting as a tonic to the system; 2nd, by strengthening in a peculiar manner the skin and mucous membrane, the parts where morbific impressions producing catarrh are generally made.

Cold bathing may be said to be applicable to the entire class of the neuroses, characterised by great mobility of the nervous functions and irregular action of the muscular system, provided there be no considerable physical change in any viscus, and provided the first impression be not too powerful. The use of the cold bath is also beneficial in several chronic affections of mucous membrane attended with discharges, when such discharge seems to depend on relaxation. In cases of passive hæmorrhages, such as epistaxis, menorrhagia, it is sometimes useful. In the intervals of asthma, when the system is otherwise in a state contra-indicating the use of the remedy, the cold bath is found very beneficial.

The state of the system, or other circumstances which either forbid cold bathing altogether, or render great caution necessary in its use, are as follow:

1. The cold bath is less applicable in infancy and old age, than in youth or middle age.

2. It is inadmissible during the menstrual period, and only with great caution during pregnancy.

3. In cases of great plethora; also where there exists predisposition to active hæmorrhage, to local visceral congestions, &c., and hence in apoplectic subjects, or in a tendency to hæmoptysis, it is contra-indicated.

4. In diseases of the heart, or where there is a feeble and thin heart, as often happens in strumous and phthisical subjects, it is dangerous.

5. Cold bathing is inadmissible in indurations or chronic inflammations of the viscera; in acute inflammation of the same organs.

6. It is inadmissible in constipation of the bowels, especially if accompanied with a gorged state of the abdominal venous system—as also, generally speaking, in cutaneous eruptions—and again, in states of great general debility, where there does not exist a sufficient power of reaction.*

Exercise is also a tonic oftentimes employed with much advantage in the re-establishment of health: when combined with amusement of the mind, and change of scene, such as that afforded by travelling, its salutary effects are oftentimes truly extraordinary. If we but consider the effects which active exercise is capable of producing, and the effort which it requires, we cannot fail to discover the cases in which it may be found advantageous or the contrary. During the acute stage of diseases, it is, of course, altogether inadmissible; and as its effect is to augment the energy of the circulation, it should not be employed where there exists hyperemia of any organ; yet if mere obstructions should exist, the effect of exercise may be to remove them.

It is in the class of nervous disorders that exercise—more especially travelling exercise, is found to be so strikingly beneficial. The tonic influence arising from occupations of the mind by a succession of pleasing objects is frequently exemplified in the case of those dyspeptic and hypochondriac patients, who derive such decided benefit from change of air, or rather from change of scene, and from the new impressions produced on the mind, though the principal share of the good is ordinarily referred to the physical effect of exercise.

In the class of tonics may well be numbered *confidence* and *hope*. The great influence of confidence in the physician with respect to the successful administration of medicine is well known in malignant diseases; more especially it is of the utmost consequence that the patient should not give up hope, but on the contrary, that he should cherish it as one of the most valuable remedial agents in effecting a recovery. On this point we cannot do better than quote the lines of Dr. Armstrong, a poet as well as a physician, so very apposite on this occasion, and which have been already cited by Dr. Dunglison:

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* For further and very valuable information on the use of the cold bath, as well as of bathing in general, see Cyclopædia of Practical Medicine, Art. *Bathing*, by Dr. J. Forbes.

> "Whatever cheerful and serene
> Supports the mind, supports the body too;
> Hence the most vital movement mortals feel
> Is hope; the balm and life-blood of the soul;
> It pleases, and it lasts."

The blighting effects of hope deferred or entirely lost are equally manifest. In many cases the physician will inevitably destroy his patient by depriving him of all hope. The increased depression produced by such a deprivation in a system already sunk and reduced by the exhausting influence of disease, is too much to emerge from. The description of the Lazar-house given by Milton, and quoted by Dr. A. T. Thomson, in which, amid the frightful evils there depicted, the greatest evil is the loss of hope, or despair, is too beautiful and too true to nature to be here omitted:

> A Lazar-house it seemed, wherein were laid
> Numbers of all diseased, all maladies
> Of ghastly spasm, or raking torture, qualms
> Of heartsick agony, all feverous kinds,
> Convulsions, epilepsies, fierce catarrhs,
> Intestine stone and ulcers, colic pangs,
> Demoniac phrenzy, moping melancholy,
> And moon-struck madness, pining atrophy,
> Marasmus, and wide-wasting pestilence,
> Dropsies, and asthmas, and joint-racking rheums.
> Dire was the tossing, deep the groans; Despair

Tended the sick, busiest from couch to couch;
And over them triumphant Death his dart
Shook, but delayed to strike, though oft invok'd
With vows, as their chief good and final hope."

ASTRINGENTS.

By astringent medicines are understood those which increase the cohesion of the parts of the body by corrugating and condensing their fibres. The presence of the astringent principle may be readily recognized by the organs of taste from its property of corrugating the papillæ of the tongue, and of communicating a peculiar sensation of roughness to the palate. Some writers have endeavoured to explain the action of astringents on the living body by a reference to their power of hardening and condensing dead animal matter. Such a mechanical explanation may certainly, in some cases, be admissible; but medicines of this class seem also to exert their peculiar influence on the living principle of the body, as is evident from their property of acting as tonics, of curing intermittent fever, and of removing states of general debility.

The principal astringent substances used in medicine are derived from the vegetable kingdom, as oak-bark, tormentil, rhatany root, catechu, &c.; and chemistry has shown that they are indebted for their astringent powers to a peculiar principle called tannin, which is characterised by the property of forming an insoluble compound with animal gelatine. From the circumstance of tonics often proving astringent, tonics and astringents have been set down by most writers as identical; the presence of tannin, however, which is indispensable to astringents, is by no means so to constitute a tonic; thus we know quinine (a tonic) possesses no tannin, whilst oak-bark, catechu, (astringent,) which possess it in a large amount, are endowed with very slight tonic powers. Several powerful astringent remedies are also derived from the mineral kingdom, as the mineral acids, and their combination wiith some of the metals, as the sulphates of zinc, iron, and copper, the nitrate of silver. acetate of lead, &c.

With respect to the modus operandi of astringents, little remains to be said more than has been said under the head of tonics: like the latter class of medicines, they may be considered as producing their beneficial effects by their astringent action on the congested or relaxed capillaries of certain parts. In this way we may explain their power of repressing the morbidly increased secretions of organs, as also of checking hæmorrhages. The impression which these substances make on the surface to which they are immediately applied, occasions a fibrillary contraction in the more deep-seated tissues. This effect takes place in all the organs, when the principles of the astringent substance are absorbed in sufficient quantity to extend their influence to all the animal economy.

Characters of the Astringent Medication.

Notwithstanding the marked shades which exist between the properties of the different astringents, they all, however, whether physical or chemical, are united by common characters in their mode of acting locally or on the general system. They all constringe more or less the cutaneous or mucous surfaces with which they came in contact, increase the tonicity of the tissues, and excite momentarily their vital properties; this excitement, however, is purely local and temporary. When their use is continued for a considerable time, they have the effect of blunting the sensibility of the organs to which they are applied, and of diminishing their contractile properties by increasing their density. Astringents administered internally act on the organs of digestion nearly in the same way as we have stated them to act on mucous membranes. If they are given in large doses, especially in the case of irritable persons, they give rise to painful constriction of the stomach, which is soon communicated to the neighbouring organs which sympathise with it, as the lungs ; and gastrodynia, accompanied by pain of chest, is almost invariably produced with more or less rapidity. Their use, when continued for some time, occasions a certain degree of constriction through the whole course of the intestinal canal, and diminishes the mucous secretion of this tube. In this respect astringents come to be confounded with tonics, just as all the tonics which contain more or less of tannin, approach very closely to astringents in their modes of action, when their employment is not long continued. It is to be observed, however, that the tonic effect of astringents is always more or less limited and confined to the organs to which they are immediately applied, and that they do not occasion general reaction on all the other organs, as real tonics. Their effects are owing more to mere astriction of tissue than to an increase of the vital properties. The astringent plan of treatment must then be of short duration, as when continued for any length of time it never fails to prove injurious.

Astringents, by their action on the capillaries, and by destroying the sensibility of these organs, diminish progressively the several secretions and excretions, not only of the organs with which they are directly in contact, but also of those which sympathise more or less with the intestinal canal. Thus, sugar of lead, alum, and several other astringents, diminish the cutaneous secretion at the same time they diminish diarrhœa.

On the therapeutical employment of Astringents.

From what has been said of the astringent mode of treatment, it will be no difficult matter to distinguish when its adoption is likely to prove useful and when injurious. In all acute inflammations, and even in those of a chronic nature, with serious alteration of the tissues, or in those accompanied with fever; in gastritis, even of a chronic form, and in all the forms of dysentery, medicines of this class almost invariably prove injurious. The practitioners who have recommended them in the latter disease from the success which they have experienced from their use, must have confounded diarrhœa with dysentery. Those tonic substances which possess but a very slight astringent power are, however, sometimes found useful in the last stage of dysentery. In the last stage of those diarrhœas which depend on inflammation of the large intestine, we may occasionally attempt the use of astringent remedies, and even then not without the greatest precaution. It is only in those intestinal fluxes, not accompanied by irritation of the colon, and which are not of a critical nature, that any very marked benefit is obtained from the use of astringents. There are some diarrhœas useful in chronic engorgements of the liver and spleen, which we should be very cautious in interfering with.

It is well known that the morbid excess of different discharges may depend on various and even opposite states of the system; and hence different remedies are indicated; hence it is that substances from the other classes may act as astringents; the knowledge of this fact obliges us to admit with Dr. Paris, the existence of *absolute* and *relative* remedies; thus in diarrhœa occasioned by the inordinate flow of acid fluids into the intestines, by which their peristaltic motion is morbidly increased, astringents proper may be employed with benefit, which, by repressing the excessive secretion, repress the diarrhœa. Under similar circumstances a narcotic, by diminishing the sensibility of the mucous surface, and rendering it less susceptible to the stimulus of such secretion, may produce the same good effect, though by a different mode of operation. Again, the ame alleviation of the diarrhœa may be effected by a remedy vhich neither represses the inordinate flow, nor diminishes the ensibility of the intestinal surface, but, by acting chemically n the irritating discharge, produces its good effects by neu-ralising the offending qualities of such discharge ; in this way ve may suppose those medicines called *absorbents* to act.

The anti-diaphoretic secondary action of astringents has been esorted to with advantage in relieving the severe sweating of hthisical patients; the medicine most effectual for this pur-ose is the acetate of lead ; the sulphuric acid also is much mployed in such cases.

In passive hæmorrhages the employment of astringents has een found most beneficial ; as for instance, in hemoptysis, ematemesis, hematuria, menorrhagia; the distinction, how-ver, between active and passive hæmorrhage is often more pecious than real. In a great many cases hæmorrhage appa-ently passive is the only ostensible symptom of some con-ealed irritation or latent inflammation, or even of some rganic degenerescence ; in such cases the use of astringents hould be ventured on with extreme caution. It is obvious ow injurious astringent injections must prove in hæmorrhages hich depend on organic disease of the uterus.

In anorexia arising from weakness of the stomach, as also in he treatment of chronic coughs and chronic catarrhs, astrin-ents are sometimes resorted to with benefit—in such cases the bstance most valued by continental physicians is the con-erve of roses. In hemoptysis also, this substance, by its pro-erty of gently stimulating the energy of the lungs, is said to e capable of removing the congestion which keeps up the san-uineous exhalation on the surface of the bronchi. It is not ery improbable that several cases of hemoptysis may be occa-oned by softening of the pulmonary tissue, a state which may e removed by the continued use of conserve of roses ; in such cases it may be given in combination with nitrate of potass. The salt makes a peculiar impression on the gastric surface, which seems to modify the state of the plexuses of the great sympathetic nerve: this impression, by suddenly diminishing arterial action, reduces the frequency of the pulse. The same substance is also employed with advantage in the form of gargle in relaxation of the posterior fauces.

Astringents are sometimes employed locally for the purpose of checking hæmorrhage; in this case they are called *styptics.*

CHAPTER XI.

Evacuants in general—Their effects—Species of—Debilitants—Effects of—Caution in the use of—When indicated—Parts of the debilitating method — Rest — Abstinence—Emetics — Cathartics —Divided into Purgatives and Laxatives—Purgatives—Laxatives—Emmenagogues—Anthelmintics—Diuretics — Diaphoretics—Expectorants—Warm-bath —Blood-letting—Diluents and Emollients.

ON EVACUANTS IN GENERAL.

In the several species or forms of the evacuant plan of treat-nent, the object of the physician is to remove sometimes the roper fluids of the body, and sometimes foreign substances, vhich enter it from without, or have been generated in it in con-equence of morbid secretions, or of the suspension of the normal vacuations, by promoting the natural secretions and excre-ons, or by means purely artificial. This important depart-ient of medical treatment, which has been at one time iuch resorted to, and at other times neglected, according the prevailing theories of the day, is attended with arious effects, depending partly on the quality and quantity the matters evacuated, and partly on the properties of the acuant employed; and with respect to it, it is necessary not erely to think of evacuating the fluids, or of lowering vital tion, but due regard must be had also to the various influ-ice of such treatment on the functional and organic relations, hereby it is capable of answering various indications.

Thus, evacuations may, in the first place, diminish the quan-y of the fluids, and therefore may prove serviceable where ere exists too great a quantity of them, either in the entire body or in individual parts. Evacuating remedies may also give a new direction to the pressure of the fluids, may re-establish suppressed evacuations, or compensate them by another, and thus prove serviceable by derivation or revulsion.

Lastly, by abstracting the juices which go to keep up the system, evacuants are capable of producing debility, and this in proportion as the material evacuated is more important, as the blood for instance, and also in proportion as the evacuation is more copious and more rapid. It is incorrect, however, to consider evacuants as necessarily and universally debilitating, as they also produce other effects oftentimes of much importance, and which overbalance considerably the debility resulting from them, many evacuants being capable of producing stimulant and even strengthening effects by removing excessive or noxious materials, which interfere with and impede the activity of certain organs. However, in the employment of evacuants we must always have regard to the degree of debility existing at the time; and where such debility is very great, we must either discontinue the evacuation altogether, or employ it with greater caution, or combine with it stimulating and strengthening remedies.

As one of the chief objects for employing evacuants is to produce a debilitating or antiphlogistic effect, and as the occasions which indicate the debilitating plan of treatment are by far the most frequent in the practice of medicine, we shall now lay down some rules to guide the junior practitioner in the employment of this powerful instrument. The cases which require the antiphlogistic or debilitating method of treatment are those of a febrile or inflammatory character, attended with a hypersthenic state of the system more or less marked. We shall first consider the action of debilitants in general, and then proceed to consider the various species of debilitating agents.

Debilitation is effected by various means, either indirectly by preventing the process of nutrition by means of low diet, or directly by lowering the vital powers by repeated blood-letting. These different means are most frequently combined, for the purpose of obtaining more rapidly the effect desired. The action of debilitating means must be proportioned to the different circumstances in which the individual is placed, on whom we intend to act. The child and old person will yield to the influence of much less energetic means than the adult; the soft lymphatic temperament will give much less resistance than the sanguineous and bilious temperament.

The general effects of debilitating means are to diminish the too energetic action of the solids, to restore them to their natural rhythm, when they have swerved from it, to soothe pain and irritation, to regulate the course of the fluids by diminishing the too violent contractions of the heart, and thus to facilitate the resolution of diseases, and to cut short their duration. These means are indicated in many diseases, and are employed at the outset of almost all febrile affections, in which there generally exists more or less excitement. It is, however, in the acute and chronic phlegmasiæ, as well as in some of the neuroses and in severe neuralgic affections, that debilitating means are more especially employed. In the former case they are called antiphlogistics, in the latter sedatives.

The employment of debilitants requires in some cases great attention on the part of the practitioner; for valuable as these means are when there is excess of strength, they would prove very dangerous in the contrary case. Medical men have admitted a direct debility, and an indirect or insidious debility, which is the result of oppression rather than of diminution of strength. We should also be on our guard against a sort of reaction or of indirect irritation, which is no less deceptive than the debility just mentioned. In certain diseases of a malignant character, as in typhus and bad intermittents, we occasionally observe apparent movements of reaction and excitement, accompanied with intense headache, or acute pains in some other parts of the body, and generally followed by extreme and fatal prostration; in such cases active debilitants would be very mischievous. It is therefore of the utmost importance carefully to consider all the circumstances which may throw light on the nature of the disease, to weigh duly and justly the amount of strength in the patient, and not to be carried away in our judgment by observing a momentary and passing reaction, but to observe the general course and the aggregate of the symptoms, which can alone direct us in determining the means to be employed. It is of the utmost importance not to allow ourselves to be imposed on by delusive appearances; and in case of doubt, it is much better to observe and temporize, than, by a too active treatment, to hurry on an adynamic or ataxic state, in which art can employ but very powerless remedies.

When debilitants are indicated, and evidently useful, we should always be very cautious with respect to continuing the use of them for too long a time; for such means, which only lower the strength when they are used for a short time, eventually exhaust it, and bring on direct debility, if their action is kept up for too long a time; the consequence of this is a lingering, tedious convalescence. This debility then assumes a morbid character; it not only retards the re-establishment of health, but also disposes to relapses, and renders the individual more obnoxious to morbific agents. We shall now consider the several means employed in medicine for the purpose of producing debilitation.

The means most commonly employed as debilitants are: general rest of the body as well as that of the organ affected: abstinence, emetics, purgatives, diuretics, diaphoretics, blood-letting; as ancillary to these means may be mentioned the warm-bath, diluents, and emollients.

Rest and abstinence.—The necessity of rest and abstinence is pointed out by nature herself. The pain and other inconveniences occasioned by exercising the organ or organs affected, instinctively suggest the expediency of observing this rule. The loss of appetite which accompanies acute or febrile diseases may be considered a salutary admonition on the part of nature not to introduce into the system new sources of irritation. The effects of rest are as follow: it checks the circulation and innervation in the part affected; the advantage of this will at once appear by recollecting that in every irritated part or organ the innervation is increased as well as the circulation, and that it is the latter that brings the materials of engorgement and congestion, which constitute one of the principal phenomena of inflammation. Means therefore which check these two organic acts, cannot but be attended with the most favourable results. If rest be continued for a length of time, the function of nutrition ceases in the inert organ, a necessary consequence of checking the circulation. The part at rest diminishes in size, the muscular fulness disappears, the skin covering it becomes pale, its temperature is lowered, and it becomes unable to move. If the rest be general, the action of the heart and brain is retarded, the animal heat is diminished, and the organic movements of the other viscera which are dependent on them become suspended; the entire system becomes enfeebled in proportion as the rest is strict, and also in proportion to its duration. The stomach soon feels this debilitating influence, as also the other parts of the alimentary canal; but this debilitating influence, so much to be dreaded in the healthy state, is of so much the more advantage, as it assists in diminishing the general excitement which want of appetite necessarily produces, by the absence of all necessity for repairing the losses sustained by the individual; it prevents him from introducing aliment into the stomach, and thus acts as abstinence; and again, intestinal absorption now becoming languid, even though the patient took nutriment, it would be absorbed only in a very small quantity.

The respiration also becomes less frequent, hematosis less active; the blood consequently becomes poorer and less stimulating. The brain, so powerfully excited by active exercise, also has its action retarded; sensibility becomes diminished, and the organs of locomotion more especially feel the effects of inaction; the muscles become soft, pale, and flaccid; their contractility becomes diminished; they are brought to act with difficulty, and they are soon fatigued; at length they diminish in size, and become atrophied. Thus, then, rest is essentially debilitating in its effects, and is of serious use in the treatment of acute diseases, by effectually concurring in producing their resolution and seconding the other antiphlogistic means.

Abstinence next claims our attention, as being one of the most powerful means employed in the treatment of acute diseases. Its effects on the system admit of a very ready explanation. The life of the individual is a series of movements of composition and decomposition. The former are effected by digestion, chylification, hematosis, and assimilation; the latter by the pulmonary, cutaneous, and intestinal exhalations, by the various excretions, by the various acts of the brain, &c. When these two classes of movements are duly proportioned, the individual is sustained in an equilibrium of strength which constitutes his normal or physiological state. The organs suffer and repair their losses in due proportion. Now if, from any cause, the individual is deprived of the means of reparation, the following are the results which take place: the functions of decomposition still continuing to go on, the blood will cease to convey into the organs the materials of their support, inasmuch as it has not received any supply through the process of digestion; on the other hand, as the vessels cannot remain empty, they must become filled at the expense of the blood contained in the different viscera; the result of this is an increase of interstitial absorption: now, this function being stimulated throughout the entire system, must be also increased in the affected organ, and thus the resolution of the inflammatory engorgement in it must be facilitated. Thus we see two important effects produced by abstinence; first a negative effect, in consequence of our preventing new materials of reparation, and consequently of engorgement from being conveyed into the diseased organ, and secondly a positive effect, inasmuch as we stimulate that function whose office it is to effect the resolution of diseases.

The consecutive effects of total abstinence are made manifest by general paleness, diminution of heat, collapse of the cutaneous vessels, weakness, softness, and slowness of the pulse, languor, and inertness of most of the functions, except the function of the stomach, which becomes more energetic, and that of interstitial absorption. The intellectual and moral faculties, as also the power of locomotion, participate in this general state of languor.

If abstinence were extended equally to drinks and to solid alimentary substances, the blood would diminish in quantity, but would retain its consistence and density; nay, more, it is probable it would acquire greater consistence, so as even still to retain its inflammatory qualities, if it did not acquire new ones. We would then fail in attaining the end aimed at; abstinence would no longer be antiphlogistic. But nature, ever watchful for our preservation, has given to us a monitor which points out the necessary line of conduct, namely, an urgent feeling of thirst. Such a feeling would be the inevitable result of the privation of drinks, if it were not already the effect of acute diseases. This irresistible desire or necessity for fluids obliges us to introduce into the system a greater or less quantity of aqueous drinks, the advantages of which are by no means inconsiderable. Of all the diluent, demulcent, and emollient fluids used in medicine, it should be remembered that water constitutes the chief and essential ingredient; the various substances infused in it for these preparations may impart some slight differences, but still the essentially active principle is water. When water is introduced by intestinal absorption into the torrent of the circulation, it produces the following effects: it renders the blood more fluid, thinner, and less dense, less compact, and accordingly less inflammatory. This diluted blood, thus carried towards the inflamed organ, is not only deprived of its inflammatory qualities, but is moreover endowed with essentially opposite properties; it is antiphlogistic in the full force of the expression; i. e. fitted to extinguish irritation and inflammation.

The consecutive effects of diluent drinks are to relax the solids by increasing the proportion of the fluids, to diminish the general excitability, and chiefly that of the brain, and thereby that of the entire system, by depriving the blood of its stimulating properties. The diluents now referred to consist chiefly of certain vegetable infusions and decoctions, such as barley-water, linseed-tea, solutions of gum arabic, &c., to which may be added, whey, chicken-broth, and veal-broth.

Some diluents appear to possess the power of refrigerating in a higher degree than the preceding; those, we mean, which are endowed with a certain degree of acidity; for this purpose some of the vegetable or mineral acids are employed, diluted with water, as the acetic, citric, malic, tartaric, and sulphuric acids. When the acidity is not too marked, and the temperature of these drinks is cool, they are found to quench the thirst more readily than the preceding, and are to be preferred in cases of gastro-intestinal irritation, and in very warm weather—their effects in other respects are similar to the preceding.

EMETICS.

Emetics have been defined to be "substances which excite vomiting, independent of any effect arising from the stimulus of quantity; or of that occasioned by any nauseous taste or flavour.*

The influence of the brain and nervous system is indispensably necessary for the production of vomiting, as is evident from the great difficulty of causing it, in cases of profound intoxication, or in severe injuries of the head, or where the powers of the nervous system have been paralysed by the operation of a narcotic. M. Magendie will have it, that vomiting is produced exclusively by the agency of the brain on the abdominal muscles, and goes so far as to maintain that the stomach itself is passive on the occasion. Dr. R. Harrison modifies this mode of considering the subject, and explains the production of vomiting in this way: "The irritation of the stomach makes a call upon the brain for the aid of the diaphragm and the abdominal muscles, in order to expel its contents; the diaphragm then becomes contracted and fixed, the ribs drawn down, and the abdominal muscles drawn inwards, so that the stomach is pressed on all sides by voluntary muscles, which, together WITH ITS OWN CONTRACTION, expel the contents."

When an emetic is taken into the stomach, it irritates its internal surface, and this irritation is soon extended to the duodenal surface. This irritation increases the secretions of the mucous cryptæ of these organs; it gives rise at the same time to considerable serous exhalation. The irritation of the gall and pancreatic ducts is suddenly followed by a state of orgasm in the liver and pancreas; the bile, now secreted in increased quantity, flows into the intestinal canal. But whilst these effects are taking place, the apparatus of innervation shows that it also feels the power of the emetic. It is in consequence of strong impression made on the medulla oblongata that this part loses its normal state, and its influence assumes quite another character; it now calls forth all those efforts and muscular contractions which bring on vomiting. This change in the state of the spinal marrow is indicated by the pains, sense of dragging, and those cramps in the extremities which frequently accompany the operation of emetics. It is also in consequence of the change in the condition of the ganglionic plexuses, as well as from a change in their influence on the viscera, that we observe a lowering and concentration of the pulse, a diminution of the animal temperature, paleness, change in the features, a feeling of distress in the epigastrium, &c.

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* Paris' Pharmacologia.

In the operation of an emetic we have to consider: 1. The irritation of the gastro-duodenal surface: 2. the secretions occasioned by this irritation: 3. the changes effected in the influence of the different centres of innervation: 4. the series of efforts and of muscular contractions which produce vomiting.

IMMEDIATE EFFECTS PRODUCED BY EMETICS.

1. *Local action of Emetics.*—In order duly to appreciate the full importance of the action of emetics, we should consider the organization of the stomach and duodenum, as well as the physiological phenomena of which they are the seat.

The stomach consists of three coats; a peritoneal coat; a muscular coat, constituted of longitudinal and circular fibres; under ordinary circumstances, the successive contraction of these fibres pressing on the substances contained in the stomach, drives them onwards to the pylorus, and propels them into the duodenum ; a third or mucous coat lines this viscus internally ; this presents a great number of irregular folds, which appear so much the more numerous, in proportion as the organ is more contracted on itself. In the substance of this membrane very many follicles are found which secrete the mucus usually found in the interior of the stomach. The stomach receives four arteries which supply it abundantly with blood. It also receives a great number of nervous filaments from the eighth pair or pneumo-gastric nerve, and which connect it intimately with the medulla oblongata ; this viscus, also, is included within the irradiation of the solar plexus, and its nerves communicate with all the nerves of the ganglionic system. There are direct relations subsisting between it and the spinal cord. Thus, the impressions which the stomach receives, appear, by reason of the sympathetic connexions which it maintains with the different centres of innervation, to be sent at once throughout the entire system.

The duodenum is a continuation of the stomach, which it resembles in its organization. In the act of digestion, the duodenum receives the substances contained in the stomach ; whilst at other times the duodenum drives back the substances contained within it, into the stomach. This circumstance becomes interesting, when we come to consider the operation of emetics. We observe that it is in the duodenum the excretory ducts terminate, which bring from the liver and pancreas the fluids secreted by these organs. Now the irritation caused by the emetic on the extremity of these ducts is, as it were, felt by the organs to which they belong. During the action of an emetic they undergo a change similar to that produced in the salivary glands, when we keep in the mouth any substance capable of irritating the extremity of their excretory ducts. The gastro-duodenal surface on which emetics act, possesses a high degree of absorbing power.

Irritation of the Gastric and Duodenal Surface.

When an emetic is taken into the stomach, it soon displays its peculiar powers ; it irritates this organ, and causes the blood to penetrate and traverse the capillaries on the surface of its lining membrane ; the stomach become more red, its temperature and sensibility also become augmented. When the emetic has been propelled by the contractile powers of this viscus into the duodenum, it makes a similar impression on that part, and excites there the same phenomena. The effects of this irritation of the emetic may be stated as follows: 1. The exhalation which usually moistens the mucous membrane of the digestive passages, becomes accelerated and much increased. Darwin mentions a person who had swallowed only one pint of drink, and, after taking an emetic, vomited about six pints of liquid. 2. The secretions of the mucous follicles are also increased, as is proved by the abundance of thick, ropy, and viscid matter which is discharged by vomiting. 3. The secretions of the liver are also stimulated by the action of emetics. We are not to suppose that all the bile passed by vomiting existed in the stomach or primæ viæ before the emetic was taken. The secretion of this liquid is caused by the emetic, and is the result of its influence on the liver. This effect of emetics on the liver may be explained either by the impression they make on the duodenal surface, which, by irritating the ductus choledochus, throws the liver into a state of turgescence, produces a temporary congestion in it, and then causes it to pour out a large quantity of bile ; or else, as Magendie supposes, the molecules of the emetic are absorbed by the venous radicles, thence carried to the liver, and so produce in it that state of orgasm by which its secretions are promoted. There can be no doubt that emetics determine an instantaneous and copious secretion of bile; that during their action this liquid flows into the duodenum, that it from thence ascends into the stomach, and is rejected by the mouth.

Thus, then, the liver is capable of being stimulated, like the other secreting glands; it can be thrown into a state of turgescence, and so may give out a considerable quantity of its secretion in a few moments. Here, however, we are speaking only of the hepatic bile. In the act of vomiting, the cystic bile also is expelled from its reservoir; this effect, however, is occasioned by the mechanical action of the diaphragm and abdominal muscles, and advantage may be taken of it by the practitioner, when he may think it necessary to empty the gall-bladder and hepatic ducts, the obstruction of which parts by gall-stones is so frequently the cause of jaundice; by the same mechanical action also on the thoracic viscera expectoration may be promoted, and thus great relief may be obtained in asthma, bronchitis, &c. The pancreas is made to feel the irritating influence of emetics in the same manner as the liver, and to have its secreting functions considerably augmented by them.

Tho irritating effect of emetics is not always confined to the mucous membrane of the stomach and duodenum. When the entire of the emetic is not dislodged by the effort of vomiting, some of it passes into the intestinal canal, and produces on the inner surface of the small and large intestines an irritation which combines all the characters of purgation.

Of the vomiting caused by Emetics.

The act of vomiting presents two things for consideration: 1, the shock given by it to the entire system; 2, the quality and quantity of the matter vomited. We have only to consider an individual in the act of vomiting, to be convinced that it must exert considerable influence on all the organs.

Alone, and independently of the other products of the action of an emetic, vomiting produces on the entire system a general concussion, well deserving the attention of the practitioner; at first there is experienced merely an uneasy sensation in the epigastric region, followed by depression, frequent yawning, and nausea, which goes on increasing, and terminates in considerable efforts to vomit. At the moment the vomiting takes place, and that the contents of the stomach are discharged by the mouth, the diaphragm and abdominal muscles contract convulsively, the entire frame is violently shaken, and all the organs and viscera are made to feel violent and repeated shocks. The violence of these shocks is so great as to render it extremely perilous for persons affected with aneurism or hernia to take emetics. The pulse becomes small, contracted, and unequal; its frequency also is in general diminished. A distressing sweat precedes the act of vomiting, which is as usually followed by a profuse diaphoresis. The respiration takes place by jerks, the bronchial cells are unloaded of any mucus they may contain, and all the secretions become instantaneously increased.

Matters discharged by vomiting.—Those who take an emetic first throw up a portion of the medicine, mixed with the substances contained in the stomach. In a little time, however, they give up different fluids which are the immediate results of the irritating impression on the gastric and duodenal surface, and which were secreted only a very short time before they were expelled.

By examining the quality of the matter vomited, and taking into account the drink previously taken, as also the substances previously contained in the stomach, we may be able to ascertain what fluid it is which predominates in the matters vomited, and consequently what organ has furnished most during the action of the emetic on the digestive organs; namely, whether the exhalants of the mucous surface have been chiefly in action, as may be known by the watery nature of the fluid; or whether the mucous cryptæ have been the parts more especially stimulated, as indicated by the thick, ropy, and viscid quality of the liquid excreted; or whether the liver has been thrown into a state of turgescence, as may be known by the colour and bitter taste of the substances vomited.

2. *General action of Emetics.*—The general effects of emetics may be divided into two parts. There is one order of the phenomena, which, arising from the impression made by those substances on the nervous expansions of the mucous membrane of the stomach and duodenum, indicate the modification then occasioned in the different centres of innervation. To the plexuses of the ganglionic nerves may be referred the uneasy sensation and epigastric distress, the retardation and concentraion of the pulse, and the diminution of temperature, with the sweating, loss of colour, change in the features, &c. On the medulla oblongata depend the vomiting, as well as the contractions of the diaphragm and abdominal muscles, which produce t. The spinal marrow is the cause of the restlessness, and involuntary movements of the limbs, and more especially of the cramps in the legs, &c.

Emetics produce a second order of general effects which claim the attention of the physician, and which may be considered as the result of a sort of reaction of the entire system. Thus, after the act of vomiting has subsided, we observe the pulse to increase in fulness, as also the temperature of the body; the skin becomes flushed, and the whole body becomes bathed in perspiration, so that emetics are found at times very effectual diaphoretics.

Therapeutical use of Emetics.

Emetic substances are employed in the practice of medicine: 1, when we wish to expel by vomiting the contents of the stomach and duodenum; 2, when we desire to stimulate the secreting and exhaling organs which terminate on the gastro-intestinal surface, and thereby to produce a quick disgorgement of the parts; 3, they present a sure means of directing the vital forces towards the abdomen, and thus, with respect to the head and chest, they are capable of effecting a revulsive movement. 4. Emetics are found capable of discharging the office of other classes of medicines; thus, they often prove expectorant, diaphoretic, diuretic, and emmenagogue. 5. Emetics, when taken in nauseating doses and continued for a considerable time, are found to be powerful means of promoting absorption, diminishing or removing tumours, and hypertrophy of organs, &c. The physician, however, must be directed by the indication to be fulfilled in selecting the emetic substance; thus, if his object be to evacuate the stomach generally, and to prevent absorption, as in the case of poisoning, he selects an emetic, which occasions as little nausea as possible, and acts quickly; in such case he should employ the sulphate of zinc, or sulphate of copper; if, on the contrary, he wishes to avail himself of the secondary effects of the emetic, he prefers one which produces considerable nausea; thus, knowing how much the force of the circulation is lowered during the state of the nausea, he will adopt a nauseating emetic in the treatment of hemorrhage; recollecting also the close connexion between the circulation and the function of absorption, and the fact that by retarding the former, the latter is increased, when selecting an emetic in the treatment of anasarcous or other swellings, he will give the preference to that which produces the greatest nausea.

Affections of the digestive organs.—There is a morbid state of the stomach and duodenum, of which congestion of their mucous membrane constitutes the principal part. This membrane is tumefied ; its surface is covered with a copious mucous secretion ; the patient complains of loss of appetite, and even of a disgust for food ; the tongue is moist, broad, and loaded with a whitish coat ; there is a bad taste in the mouth, and a sense of fulness in the epigastrium. If at the same time the liver be in a state of turgescence, and there be a tendency to an abundant formation of bile, there is a bitter taste in the mouth, the tongue is yellowish, the patient complains of disagreeable eructations, and often vomits pure bile. In such a case, tartar-emetic produces the most salutary effects. The impression it makes on the gastro-duodenal surface gives rise to a copious secretion of mucus—this impression is continued on to the liver, and determines instantaneously an abundant formation of bile; after the emetic has operated, the patient feels himself much relieved ; the bitter taste, as also the nausea, epigastric fulness, and distressing feeling, are removed.

But if the gastro-duodenal surface be the seat of intense inflammation, as indicated by the red, scaly appearance of the lips, a contracted, acuminated, red, dry, chapped condition of the tongue, as also by thirst, heat, and a feeling of distress in the epigastric region, emetics are doubtful remedies, and oftentimes very mischievous ; as they tend to exasperate all the symptoms, and to exaggerate the morbid lesion of the affected parts.

In cases of poisoning by narcotics, tartarised antimony is the emetic most frequently resorted to ; the great difficulty experienced in exciting emesis in such cases, renders it necessary to employ it in a very large dose. Dr. Paris gives, however, a very useful caution, which should be observed on such occasions, viz. " Not to allow the apparently inactive state of the stomach to induce us inconsiderately to augment the dose of an emetic." The reason of this caution is sufficiently obvious; though the brain may be paralysed by the action of the narcotic, and therefore unable to transmit its influence to the stomach, still the stomach may retain its sensibility, and be therefore liable to inflammation. Large doses of tartar-emetic have been given in the treatment of painter's colic: by irritating the extremities of the nerves along the mucous membrane of the intestines, it is considered capable of correcting the morbid state of the plexuses of the ganglionic nerves, and of the spinal cord, and also of awakening and arousing the intestinal nerves from the state of stupor in which the sedative influence of the lead has placed them.

In the treatment of *diarrhœa* and *dysentery*, emetics have sometimes proved effectual by acting as revellents. The use of emetics in the treatment of *jaundice* has been already adverted to —they are more effectual and also safer, according to Dr. Stokes, in the early than in the late stages of this affection, especially where there is reason to suspect the existence of organic disease of the liver; great caution is also necessary in such cases where the gall-bladder is distended, as rupture of this organ has been occasioned by the operation of an emetic, and fatal peritonitis been produced.

Diseases of the respiratory organs.—Emetics have been employed sometimes with advantage in *croup*, in *amygdalitis*, in *bronchitis*, and *pulmonary catarrh*. In these affections they seem to produce their good effects by their revellent influence. In *hemoptysis* also, nauseating doses of emetics have been found beneficial by their sedative action on the circulation. In *pneumonia*, tartar-emetic has been very extensively employed, not, however, for its evacuant properties; it has been considered to possess specific powers in controlling pulmonic inflammation. Bleeding, both general and local, however, should be resorted to in the first instance; and then the employment of tartar-emetic is found to perpetuate the impression produced by bleeding more effectually than any other medicine, and to insure the relief of the patient, at a smaller expense of blood and strength than any other method of treatment. Perhaps its modus operandi may be explained by its sedative influence on the heart's action, diminishing the vis a tergo, as well as by its constringing influence on the capillaries of the inflamed organ, after its molecules have been absorbed and taken into the circulation. Should there be symptoms of gastric inflammation, the use of tartar-emetic is contra-indicated. In the treatment of convulsive coughs, as *hooping-cough* and *asthma*, emetics have been occasionally found beneficial; those pathologists who have placed the primary seat of hooping-cough in the nervous centres, as in the medulla oblongata, and in the plexuses of the ganglionic nerves, explain its efficacy in this affection by its deriving the lesion of the nervous system to the gastric surface.

In the treatment of *phthisis*, emetics were formerly much employed; their use is now well-nigh abandoned in that disease.

Diseases of the cerebro-spinal apparatus.—In the treatment of *cerebral inflammation*, whether of the membranes, or of the substance of the brain, emetics are of doubtful efficacy. When the inflammation is acute and attended with much fever, they are decidedly contra-indicated. In *apoplexy* their use is dangerous, for obvious reasons. The utility of emetics has been lauded by some in *mania*. The benefit derived from their use in this affection may depend, probably, on the shock they communicate to the nervous system.

In *hypochondriasis*, where the digestive functions are executed with great torpor, the occasional use of an emetic may be attended with good results.

In *epilepsy* and the *convulsions of children*, where no organic mischief exists, and where the affection appears to be more or less connected with irritation in the digestive canal, emetics may be found useful.

In *wounds of the head*, Desault was in the habit of giving tartar-emetic in small doses and at long intervals, so as to avoid vomiting ; by its means he established on the gastro-intestinal surface a salutary irritation, which relieved the inflammatory state of the arachnoid.

In *amaurosis*, the use of emetics has been recommended by Richter ; so far as impaired or depraved vision arises sympathetically from disorder in the digestive organs, they may certainly prove useful.

In the treatment of *uterine hemorrhage*, emetics have been set down as beneficial ; the act of vomiting, by the shock it gives to the uterus, is supposed to constringe the vessels through which the blood escaped, and thus to arrest the discharge ; more prompt and effectual means, however, may be resorted to for this purpose.

In *dropsy*, nauseating emetics have been sometimes resorted to with advantage—their modus operandi we have already explained.

In the treatment of all *febrile diseases*, emetics were formerly very much employed ; in those of the *intermittent* form, they are used for two purposes,—to produce a powerful impression on the nervous system, and to evacuate the contents of the stomach : when the former end is desired, nauseating emetics are to be selected, as ipecacuanha or tartar-emetic ; where the object is to arrest the paroxysm of an intermittent, the emetic should be given a short time before the occurrence of the cold stage. In the treatment of *continued fevers*, emetics are now much less employed than formerly. The benefits derived from them seem mainly to depend, first, on their freeing the stomach from morbid secretions ; then on their revellent influence, as also on their power of equalising the sanguiferous and nervous systems. Hence they prove serviceable in the exanthemata, when the eruption does not come out on the surface, but seems to be repressed or kept in from some cause.

Having now detailed the various effects of emetics, as well as their various uses in medicine, we shall conclude our notice of this class by recapitulating their chief uses, and pointing out the contra-indications, as well as the best mode of administering them.

Emetics act not only by irritating the stomach and neighbouring parts, so as to occasion increased secretion, as well as convulsive and inverted action of this viscus and of the œsophagus, and sometimes also of a great part of the intestinal canal, and at the same time give rise to spasmodic movements of the abdominal muscles and diaphragm, and thereby discharge upwards the contents of the stomach, duodenum, gall-ducts, and pancreatic duct, but moreover the irritation caused by them may extend to the nervous and vascular systems, and produce general excitement, and more especially arouse the activity of the respiratory organs, promote the secretions of the skin and the function of absorption, and remove obstructions existing in the intestinal canal. By too violent and long-continued action they may occasion congestion of blood in the head and other vital parts, and sometimes also rupture of vessels, convulsions, exhaustion, syncope, &c.

These medicines are first of all indicated where noxious or indigestible substances, sordes, poisons, &c., are to be discharged from the stomach or neighbouring parts; where there exist loathing of food, foul tongue, fœtor of the breath, bitter taste, nausea, frequent spitting, disposition to vomit, pain or other disagreeable sensations in the stomach, dizziness of head, and dark colour of the face, tremors of the underlip, &c. But they serve not only for the evacuation of impurities from the stomach, but they are also useful by giving a shock to the nervous system, and by counter-irritation, in torpid states of the system, in vertigo, melancholy, and mania, spasmodic affections, diarrhœa and other discharges ; by arousing the activity of the respiratory organs in cases where mucus or other matters are accumulated in them, and also in catarrhal affections ; by promoting the secretions of the skin, liver, &c., and also in removing obstructions and glandular enlargements by their influence on the function of absorption.

As states which contra-indicate the use of emetics, or at least which require great caution in the employment of such remedies, the following may be set down ; excessive irritability of the system, the presence of inflammation, or of organic disease, scirrhus, &c. of the stomach or contiguous organs ; plethora, wherein dangerous congestions in the head and chest may be caused by their use ; congestions already existing in these parts ; accumulation of blood in the viscera of the abdomen, in which case hemorrhage readily occurs ; discharge of blood, more especially from the upper parts of the body, hematemesis, hemoptysis, epistaxis ; in a less degree hemorrhages from the lower part of the body ; inflammations of the lungs and other viscera, the causes of which are not to be removed by vomiting ; hernia, (in which case, however, bad consequences may be avoided by supporting the protruded part by means of a belt or with the hand) ; painful, spasmodic impaction of gall-stones, renal or vesical calculi ; organic diseases of the thoracic viscera, aneurysms of the heart or aorta, &c., (though in case of vomica an emetic, if care be taken, may prove serviceable ;) pregnancy, old age, (where emetics should be given only on great emergencies ;) great debility ; lastly, idiosyncrasy or peculiar form of the body, or of some particular parts, in which case it is difficult and even dangerous to vomit some persons, those, for instance, who have a badly-formed chest, a short, thick neck, &c.

Vomiting, more especially when there already exists a disposition to it, may be excited and kept up by means of tepid water, or any other drink taken in large quantity, capable of exciting nausea, as camomile-tea; also, by tickling the throat with a finger, a feather, &c., or by gently rubbing the epigastric region in a circular direction. The emetics most used and most important in ordinary cases, are ipecacuanha, which acts mildly, seldom exciting diarrhœa, and which is accordingly better adapted to sensitive, feeble persons, disposed to cramps, or already suffering from diarrhœa; and tartar-emetic, which acts more powerfully and more rapidly, usually excites intestinal evacuations, and accordingly is to be used in the case of individuals who are not very easily excited, or who are of a torpid, sluggish habit, where there is tough and viscid mucus to be discharged, and where alvine evacuations may also be necessary. Tartar-emetic is sometimes combined with ipecacuanha, to which oxymel of squill may be advantageously added, which latter preparation may be employed by itself as a gentle emetic, especially for the dislodgment of mucus. Sulphates of zinc and of copper, from the rapidity and strength of their action, are more especially indicated in cases of poisoning.

In many cases it is necessary to prepare the system, in order to render the action of the emetic more easy and certain.

Thus, in case of plethora, and violent orgasm of the system, venesection should take the precedency.

Emetics are, generally speaking, best given at a time when the body is more easily moved, and when the stomach is not loaded with recently-taken food, as in the morning, for instance; in fevers the time of the remission is generally to be preferred.

The neck and chest must be perfectly free, and the patient must be placed in such a position that the vomiting may go on with ease.

In general, emetics are given in divided doses; but after short intervals of from ten to fifteen minutes, so as to avoid too violent vomiting. However, the doses should not be too small, as their effect would then be to excite very distressing straining, or, especially in the case of tartar-emetic, purging rather than vomiting. In cases also where there exists an urgent necessity to excite vomiting rapidly, as after poisoning, or where the stomach is very insensible, full doses of a very strong emetic must be given.

In order that sufficient evacuation may be produced by vomiting, the act must, generally speaking, be repeated at least three or four times, or until pure bile is thrown up. To promote and facilitate this, after the emetic is taken, but not before the occurrence of nausea shows that vomiting will soon take place, warm water or weak tea may be drunk, and this should be repeated after each act of vomiting. If this, however, be done too soon, a portion of the emetic may be discharged from the stomach, or it may be too much diluted.

In cases where the emetic cannot be introduced into the stomach, it has been recommended to administer it in the form of enema, in which way its action is rather uncertain, or by injection into the veins,—an expedient to be resorted to only in cases of the greatest danger.

After vomiting, it is advisable that the patient keep himself quiet, and avoid strong food for the day. But if sickness should still continue, sweetened acids, or even opiates, may be given according to circumstances, which latter also may be found useful in relieving the great distress, spasms, &c., sometimes occasioned by vomiting.

If excessive vomiting is occasioned, those means which counteract irritation are found serviceable, especially tepid cream, oily fluids, opium, coffee, peppermint water, aromatics, palatable acids, small portions of wine, &c.; as also fomentations of spirituous, aromatic, or soothing substances to the epigastric region, or cupping-glasses placed over this part.

CATHARTICS,

Medicinal substances, which increase the peristaltic motion of the intestines, and cause them to evacuate their contents.

They may be divided into purgatives and laxatives. By purgatives are meant those pharmacological agents which produce a temporary irritation on the inner surface of the intestines, excite the action of the exhalant and secreting organs of these parts, and thereby occasion alvine dejections. By laxatives are understood those substances which excite alvine evacuations by their relaxing effect on the intestines, without producing irritation or any increased action in the secreting or exhaling vessels. This distinction between purgatives and laxatives is of considerable importance in practice.

It has long been a very common error to consider alvine evacuation, in every case, as the result of one and the same pharmacological property. Such evacuation may, however, depend on very different and distinct causes. A purgative medicine, strictly so called, must possess the property of exciting on the intestinal mucous membrane a special irritation of temporary duration; and this irritation it is which we consider as the essential attribute of purgation. This irritation does not extend at one and the same time over the entire intestinal surface, but it traverses all its parts successively; and always produces, on the points where it is set up, an increase of sensibility, injection of the capillaries, redness and heat; this organic movement gives rise to a more copious exhalation of serum, a greater secretion of mucus ; it excites the instantaneous formation of a large quantity of bile, whilst it tarries within the duodenum. At the same time there are observed to take place accelerated contractions of the muscular tunic of the intestines, by means of which the contents of these organs are carried onwards to the anus, and then expelled.

On the immediate effects of purgative medicines.—A purgative scarcely reaches the stomach, when it extinguishes the appetite, and produces nausea, and sometimes vomiting. If it be not discharged by vomiting, in about one or two hours after being taken, pains are felt in the abdomen, which gradually increase ; these are accompanied by heat, and the abdomen becomes swollen. The pulse is at first small, concentrated, and unequal, especially when the colicky pains become severe ; slight and transient sensations of cold, distress, and paleness, change in the features, &c., are observed. In about two hours after, the pulse becomes more frequent ; the skin appears dry and hotter. Now it is that evacuations from the bowels take place, the quality and quantity of which are variable. All these effects present much variety with respect to their intensity and constancy ; many of them are but slightly marked, or are entirely wanting.

By ascending to the causes of these effects, we see that purgatives act principally on the intestinal surface, and that most of the phenomena which they give rise to, are derivable from an irritation which they set up on this surface.* Some of the general symptoms prove that purgatives extend their power to other organs, and chiefly to the apparatus of innervation. Thus it is to the change of state produced in the plexuses of the ganglionic nerves during the operation of purgatives that we must refer the smallness and inequality of the pulse, the feelings of cold, anxiety, paleness, change in the features, &c. It is also to the effect they produce on the lower part of the chord that we refer the cramps in the legs and thighs, so often experienced during their action.

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* For the theory of purgation advocated by the contre-stimulants, see note, page 278.

In the operation of these agents we must therefore distinguish: 1st, a local action; 2nd, a general action.

1st. *Of the local action of purgatives.*—We should first consider the anatomical structure and physiological relations of the part which receives purgatives.

Structure.—The parts of the body which are attacked by purgatives, are the small and large intestines; it is only accidentally they act on the stomach. The internal surface of the intestinal tube is lined by a mucous membrane furnished with very apparent villi. This membrane gives off a great number of circular folds, which add considerably to its extent. It presents a multitude of follicles which secrete a viscid mucus, which is much augmented by the influence of purgatives. On the interior of the duodenum open the excretory ducts of the liver and pancreas; by irritating their extremity, purgatives act sympathetically on these glands; they throw them into a state of orgasm, and very much increase their secreting functions. A serous exhalation also takes place on the intestinal surface, which is considerably augmented by the impression of purgatives.

Beneath this mucous membrane, the alimentary canal presents a muscular tunic consisting of circular and of longitudinal fibres. It is by these fibres the vermicular motion of the intestinal canal is performed, which directs the progression of the contents of this tube. These fibres, being stimulated by purgatives, accelerate their contractions; the peristaltic action of the intestines becomes more rapid, and what they contain very quickly reaches the rectum.

The intestines receive numerous arteries; their several tissues are penetrated by a great quantity of vascular ramifications; and when any irritating cause drives the blood into them, this fluid enters these organs in great abundance. On the internal surface of the alimentary canal there exists a close, compact network of capillaries; this becomes injected by the contact of a purgative; the interior of the intestines then becomes redder, and at the same time swollen, and its temperature becomes augmented.

Numerous nerves arising from the ganglia of the great sympathetic, and which are in communication with the nerves of the spinal chord, are distributed to the intestines: some branches of the pneumo-gastric nerve keep up a relation between these organs and the medulla oblongata; thus the impressions made on the intestinal nerves are continued to the three great centres of innervation.

On the irritation of the intestinal surface by purgatives.— It is needless to set about proving that the medicinal property of purgatives is of an irritating character; it being well known that these substances, when given in too large doses, are capable of producing an inflammatory state. It is, however, with the view of occasioning a slight and temporary irritation of the alimentary tube, that the physician prescribes substances of this class, the cathartic agent being neither more nor less than a body endowed with the power of exciting the irritation; its contact with the mucous membrane of the intestines suddenly gives rise to the following effects: the capillaries of this membrane become filled with blood; the membrane itself becomes redder, hotter, and more sensitive; the serous exhalation, which ordinarily moistens the interior of the canal, is now augmented; the mucous cryptæ covering this membrane act with increased energy, and secrete an increased quantity of mucus. The irritating influence of purgatives on the extremity of the ductus choledochus gives rise to other effects: it throws the liver into a state of turgescence, and causes it to secrete bile in great abundance; the same effect is produced on the pancreas.

The product of all these secretions and of the intestinal exhalation traverses the alimentary canal, and becomes mixed with the substances which existed in this organ previous to the administration of the purgative; this mixture will assume different characters, depending on the quality of the excretion which predominates. It is not to be supposed that the purgative irritation occupies the entire extent of the intestinal surface at one and the same time, nor that it presents the same intensity over all its parts. This irritation is progressive, and affects successively all the parts of the alimentary canal, commencing at the duodenum. Such irritation also is but temporary; being intense in those parts with which the purgative actually comes in contact; but it soon disappears, and progresses, so that all parts of the tube are made to feel its influence in succession. To be sure, there are some parts with which the cathartic substance remains longer in contact than others. From experiments made on living animals with purgatives, it would appear that the duodenum, colon, and rectum, are the parts of the canal which are made to feel most acutely the stimulus of purgatives. The duodenum, fixed in its position, and furnished with valvulæ conniventes, can get rid of and disengage itself from these substances but very slowly. They tarry but a short time in the rest of the small intestines, and are driven on quickly into the large. The cœcum, colon, and rectum, we know, endure the contact of these substances for a much longer time.

Influence of purgatives on the muscular coat of the intestines.—It is by the vermicular contractions of the muscular coat that the contents of the alimentary canal are propelled onwards to the rectum. The immediate impression made by the purgative on the mucous membrane, is transmitted by contiguity to the muscular layer, and thus accelerates its natural movements. The substances contained in the intestines at the time a purgative is taken, the fluids which it causes to flow into these organs, as well as the drinks taken to promote and assist its operation, quickly traverse the alimentary canal, and hence the frequent and copious alvine dejections after the use of purgatives.

Colicky pains are a constant symptom of purgation; they proceed from the irregular contraction of the fibres constituting the muscular coat of the intestines. These pains indicate a dragging in opposite directions, as it were divulsions in the tissue of this coat, and consequently in the nerves distributed to it. In the natural state there exists a perfect harmony between the movements of the longitudinal and circular fibres, a simultaneousness in the contractions of the fibres which have the same direction. The purgative irritation disturbs this harmony, and the abdominal pains which accompany the purgation arise from the irregular movements which then take place in the muscular layer of the intestines.

Of the evacuations occasioned by purgatives.—In the alvine evacuations occasioned by purgatives, we should consider; 1st, the quantity of the substances voided; 2nd, the number of the stools; 3rd, the qualities of the evacuations.

Quantity.—The quantity of the alvine evacuations occasioned by purgatives is always proportioned to the quantity of the substances contained in the intestinal canal at the time of taking the purgative, to the copiousness of the fluids discharged by the exhalant and secreting organs into the intestinal tube, as well as to the quantity of drink taken to assist the operation of the purgative. The first stools, after the employment of a purgative, consist of the contents of the cœcum, colon, and rectum; next come alimentary substances reduced into chyme, which were continuing their progress along the primæ viæ, their course being now accelerated by the action of the purgative. After this the stools become more liquid, as containing the fluids which the irritation of the purgative caused to be excreted, as well as the mucous fluids given out by the follicles diffused over the internal surface of the intestines, the bile and pancreatic fluid whose discharge is now augmented, together with the drink taken during the action of the purgative.

Number of stools.—The fluid and solid matters expelled by the action of a purgative do not pass away at one and the same time. Their expulsion takes place at variable distances; the stools are sometimes frequently repeated, at other times but rarely. Their frequency indicates great susceptibility of the colon and rectum. It is well understood that the quality of the purgative, its energy, as also the dose in which it is prescribed, will exercise considerable influence on the frequency and number of the stools. It must not be supposed, however, that we can judge of the energy of a purgative by the number of stools it occasions, nor by the quantity of the evacuations. Too violent irritation injures the free exercise of the secreting and exhaling functions: a powerful purgative, by attacking the intestinal surface too intensely, may give rise to an inconsiderable quantity of alvine evacuations; whilst a weaker purgative will occasion a greater number of stools.*

Qualities of the evacuations.—The qualities of the alvine discharges produced by purgatives are extremely various; they may present a brown, yellow, greenish or gray colour; they may be frothy or mixed with gases. There are other variations also in the dejections, depending on some morbid state of the alimentary canal, the existence and character of which are frequently discovered in this way.

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* See note, page 278.

If the alvine evacuations be very watery, the intestinal exhalation has been very active. The operation of the purgative caused, as it were, a shower of rain over the entire extent of the intestinal surface, and the liquid discharged forms the base of the alvine discharges. In certain cases of dropsy, these evacuations have been observed to dissipate œdematous swellings, and serous collections; the liquid effused into the meshes of the cellular tissue, or into the serous cavities, has been suddenly absorbed, then deposited by exhalation in the intestinal canal, and finally expelled by stool.

Purgatives frequently occasion bilious discharges by stool; this arises from the impression made by them on the functions of the liver. Some purgatives, however, contain a colouring matter in themselves, which impart a yellow colour to the evacuations, independently of any stimulation of the liver; as rhubarb, for instance, gamboge, &c.

Those purgatives which increase the intestinal exhalations, and produce serous dejections, have been called *hydragogue*;* those producing mucous stools were called *phlegmagogue*;† whilst those which occasioned a copious secretion of bile, were called *cholagogue*.‡

On the general action of purgatives.

Any person who considers attentively all that takes place in the body when subjected to the operation of a purgative, will discover changes in parts remote from the alimentary canal. These general effects depend either on the absorption of the molecules of the purgative, or on sympathetic correspondences which the irritated surface of the intestines establishes with the centres of innervation. The latter cause is that which first presents itself in studying the general effects of purgatives. These agents cannot act on the intestinal mucous surface, without the nervous expansions distributed to it feeling their impression, and transmitting it to the plexuses of the ganglionic nerves, to the spinal cord, and sometimes even to the medulla oblongata. The changes produced in these centres of innervation are manifested in the following phenomena: smallness and inequality of the pulse, feeling of cold, pallor of the countenance, alteration of the features, epigastric distress, and threatening of syncope. The cramps, and sense of muscular twitches and dragging in the limbs, proceed from the spinal marrow, and prove the inordinate and perverted influence of the nerves which arise from it.

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* ὑδωρ, water; ἀγω, to bring. † φλεγμα, mucus.

‡ χολη, bile.

If the patient vomit, it is because the medulla oblongata has been affected more or less, and has given rise to convulsive contractions of the diaphragm and abdominal muscles which produce vomiting.

If, two or three hours after the administration of the purgative, the circulation is accelerated, if the pulse become frequent, if the animal heat is much developed, if the urine become red, the mouth dry, &c., it arises from the presence of the molecules of these substances in the blood. It is well known that the use of purgatives irritates wounds and ulcers.

The absorption of the proximate principles of purgatives has been proved by numerous experiments.

There are other effects produced by the general action of purgatives; as, for instance, a diminution of the function of perspiration: *in fluxu et vomitu prohibetur perspiratio, quia divertitur.* Purgatives have, moreover, the power of weakening the vital forces by their withdrawing from the system principles which would have served for assimilation, and produced a renewal of these forces; they thus diminish the mass of blood. Practitioners have availed themselves of this circumstance, by employing purgatives to diminish the vital energy, when it became excessive. Repeated purgation is, for the same reason, opposed to plethora, and to a too active assimilation.

On the therapeutical use of Purgatives.

Purgative medicines have been in greater requisition than medicines of any other class; they have been considered as the most effectual, certain, and valuable implements of therapeutics. Their credit was based on their supposed power of drawing the morbific principles, the material causes of diseases, into the alimentary canal, in order to prepare them for expulsion from the system. The noxious humours were supposed to be carried away in the alvine dejections; and to their exit from the body those improvements were attributed which were observed to take place after the evacuations. According to the practitioners of the period to which we now refer, purgation was an operation necessarily curative. The progress of physiology, however, has divested purgation of all the importance and prestige with which the imagination of the humoral pathologists had encompassed it. Purgation is now considered as a physiological phenomenon occurring in the abdomen, and involving the action of a certain number of secreting and exhaling organs, which gives rise to increased secretion, and to repeated alvine evacuations, and makes a powerful impression on the entire apparatus of innervation. We no longer see in purgatives that mysterious virtue so efficacious in the humoral theory, and the exercise of which was to excite a depuratory movement among the parts of the blood, and thereby to purify it.

It is sufficient to consider the physiological influence of purgatives, in order to be enabled to appreciate the full extent of their therapeutic powers. Purgatives serve to empty the intestines, and to expel their contents. It is well known how important this evacuation is; in the state of health, its interruption ordinarily disturbs the exercise of the digestive functions; constipation frequently occasions weight of head, great oppression, and other troublesome effects. In the state of disease, it is still more necessary that the primæ viæ should not retain their contents too long. Again, the irritation caused by purgatives on the inner surface of the intestines, increases the secretions of the liver and pancreas, as well as those of the mucous follicles covering this surface; it augments the energy of the intestinal exhalants; all these products flow into the alimentary canal, by which means all the abdominal organs are disgorged. The evacuant effect of purgatives is useful in very many diseases. During their operation the blood is carried in increased quantity towards the abdomen; there is then more heat and increased movement in this part of the system; this increased action of the abdominal organs exercises a derivative or revulsive effect with respect to the head and chest. The irritation produced by purgatives on the nerves distributed over the intestinal surface is communicated to the plexuses of the ganglionic nerves, to the spinal cord, rarely to the medulla oblongata; this movement is diffused over the whole system, and gives a shock to the entire frame. How often do we see a drastic purgative given to a dropsical patient, suddenly stimulate the absorbent system, cause the watery fluid deposited in the cellular tissue, or in a serous cavity, to enter into the torrent of the circulation, give rise to copious liquid stools, or even to a flow of urine?

It is not unworthy of remark, that such of the old physicians as followed the Hippocratic doctrine, were led to employ purgatives in those very cases in which modern practice, guided by the light of physiology, recognises their utility at the present day, and to reject them in precisely the same circumstances in which the state of the intestinal canal would not allow us to have recourse to them. The Hippocratic maxim was, *concocta purgare et movere oportet, non cruda; neque in principiis, nisi turgeant, plurima verò non turgent.* Now the signs of this so called coction of the morbific humours, and of the necessity of evacuating them, were,—a moist state of the mouth, whitish coating of the tongue; intumescence of the abdomen and hypochondria, with softness, however, and with no pain; a soft pliant state of the skin; bilious and saffron-coloured urine; borborygmi, and soft pulse. Now these very signs indicate to the modern practitioner the precise physiological condition of the primæ viæ most favourable to the irritating influence of purgatives. The signs of the morbific humours being still in a crude state, and not yet fit for elimination, will be readily understood from the above.*

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* With respect to the doses of cathartic medicines, it is generally believed that their action is in the direct ratio of the quantity employed; this, however, is true only to a certain point; beyond certain limits the contrary is observed to take place: for example, let one drop of croton oil be given, and it will produce five or six stools, or even more; two drops will produce still more; but give five, six, or eight drops, and the effect is different; the individual will have one or two stools, or perhaps none at all. In like manner give castor oil in a dose exceeding two or three ounces, and the same result takes place. The same holds true of tartar emetic, of the extracts of aloes, colocynth, colchicum, of gamboge, and of most purgatives; that is, their evacuant power is directly as the dose up to a certain point, and inversely as the dose beyond that point. For this law respecting the action of purgatives, we are indebted to the clinical experiments of Rasori. In order to account for these apparently incomprehensible phenomena, it is necessary to remember:

1st. That purgatives do not produce alvine evacuations, until they have been absorbed and have passed into the circulation. Every one knows that purgation is produced by rubbing castor oil over the abdomen; the same effect will be obtained by injecting it into the veins, or causing it to be absorbed by the rectum, or by any other part. This applies indiscriminately to all purgatives, as well as to all other medicinal agents generally.

2nd. That every purgative substance produces a double action, one

Diseases of the Respiratory Organs.

Purgative medicines do not seem to possess much control over thoracic disease. Huxham and others tell us that epidemic coughs have disappeared on the occurrence of diarrhœa. Some medical writers prohibit the use of purgatives in pulmonic inflammation, when the expectoration is once established, when it appears to be critical and to relieve the patient; they seem apprehensive lest, in such cases, the irritation of the intestinal

on the general vitality and on the heart, as every other medicine, the other particularly confined to the digestive apparatus. It is by a sort of contrecoup, or indirect influence, that purgation takes place, and not by direct irritation, as is generally supposed. Now the primary or general action of most purgative substances is hyposthenic (sedative:) the pulse is lowered, the vital energies are depressed, and the patient experiences a degree of sinking directly proportioned to the dose of the medicine. If the dose be too great, the sedation is so marked, that the digestive apparatus scarcely feels the secondary action, the evacuations are few in number, and bloody, or else they are entirely wanting. When the dose is excessive, there may not only not be any evacuations, but the general sedative effect may be such, that the vitality of the system becomes extinct, and the patient soon dies from excess of contra-stimulus, like an animal bled to death. The most important conclusions to which these considerations would lead us, are:

1st. That cathartics act with more efficacy in moderate than in large doses.

2nd. That in large doses purgatives confine their action to the general vitality, and lower the system similarly to blood-letting.

3rd. And consequently, that most purgative medicines may be considered not only as simple evacuants, but also as antiphlogistics or sedatives.

4th. That the opinion which attributes to purgatives an irritating action, and one capable of increasing inflammation, is founded neither in theory nor in practice.—*Lancette Française, May* 1838.

We think the last conclusion (4th) requires some modification; for certain it is that drastic purgatives in over doses, such as gamboge, &c., are capable of producing local inflammation of the membranes of the primæ viæ with which they come in contact.

tube may interfere with the salutary efforts of nature. Purgatives have been lauded in the treatment of pulmonary congestion, where pulmonary apoplexy was threatened; they are supposed to prove beneficial, in such cases, by their derivative and evacuant properties.

Diseases of the Digestive Apparatus.

When the mucous membrane lining the stomach and intestines is in a state of inflammation, the use of purgatives is obviously contraindicated.

In the treatment of *enteritis*, as also of *peritonitis*, the effects of purgatives may be of the very worst character; if, in such cases, it be found necessary to evacuate the intestines, the mildest purgatives only should be resorted to. If, however, the peritoneum be inflamed, whilst the corresponding mucous coat be still in a healthy state, the employment of a purgative may be followed by beneficial effects, as it may exert in this case a salutary derivative influence. The lancet has been found the most effectual means of removing the constipation which so generally attends inflammation of the peritoneum, as this state of constipation depends on the presence of the inflammation. In *diarrhœa*, which is in general occasioned by the presence of irritating matters in the intestines, the use of gentle cathartics is almost invariably indicated in the first instance. The same rule is to be followed in treating *diarrhœa infantum*.

In the treatment of *dysentery*, purgatives were formerly considered as the principal means of cure, so long as the retention of the fæces in the cells of the colon was believed to constitute the essence of the disease; now, however, since the pathology of this affection has been more correctly understood, the purgative plan of treatment has been considerably modified; still it is acknowledged to be of the utmost consequence to unload the bowels in this disease by laxatives or gentle purgatives. Generally speaking, purgatives are found to be injurious in neuralgic affections of the intestinal canal ; yet in inflammation of its mucous coat no injury will be found to follow from their moderate and judicious employment.

In the treatment of that form of *dyspepsia* which depends on irritation of the gastric mucous membrane, the use of violent purgatives cannot be too strongly deprecated ; still the occasional employment of gentle purgatives is frequently attended with beneficial results in such cases.

In *hepatic inflammation*, purgatives, especially mercurial, followed by salines, are found of decided benefit, after blood-letting. In cases of *hepatic engorgement*, the irritation which purgatives occasion in the duodenum proves useful by causing a copious secretion of bile, and thus unloading the substance of this organ ; the same means will contribute to remove torpor of this viscus.

In the treatment of *constipation*, we should avoid those purgatives which stimulate the intestines too violently, and trust chiefly to those of a gentler quality, and to proper regimen ; drastic purgatives usually leave behind them a disposition to constipation. Should severe spasmodic pain accompany constipation, the combination of opium with the cathartic will be found beneficial, the former allaying the spasm, and the latter effecting catharsis.

In the treatment of *colic*, great caution is necessary in the use of purgatives. Some cases will yield at once to a strong purgative, whilst in others an active purgative is injurious. In general, purgatives will often produce the most expeditious relief when combined with sedatives, the sedative allaying the abnormal contraction in the muscular fibres of the intestines, whilst the purgative excites the peristaltic action, and also stimulates the secretions from the mucous membrane. Calomel with opium may be given with advantage every second hour for three or four times, to be followed by a full dose of castor-oil. Cathartic injections may also be used in aid of the above means.

Dr. Billing, according to whom the operation of a purgative is sedative, producing local morbid sensibility, and consequently increased peristaltic action, makes the following judicious remarks on the effects of excessive purging in the treatment of intestinal spasm: "It must at the same time be remembered, that too great a degree of sedative operation on the intestines will produce a stronger contraction of the peristaltic muscles—so strong, in fact, as to close the tube by spasm, called colic, which we see result in the painter's colic from the sedative effect of white lead. An unripe apple, or other fruit, produces a similar local sedative impression on a part of the colon, so that pain (griping) and spasmodic contraction result, by which the offending substance and fæces are prevented from passing. It is well known that purgatives and other sedative treatment will not cure colic; on the contrary, they increase the tormenting griping, with the misery of sickness in addition, when administered by those who think only of a 'stoppage of the bowels,' and purgatives to overcome it. Stimulants with narcotics, the warm bath, and warm aromatic drink with opium, especially in enema or suppository, will relax the colicky spasm of the intestine, and most likely produce an evacuation of the bowels; but if the latter does not occur, as soon as the spasm (of which the pain is the evidence) has been perfectly quieted, a little castor-oil will operate."

In the various forms of *hemorrhage*, the propriety of employing purgatives depends, in a great measure, on the character of such hemorrhage. When they are indicated, the benefit derivable from them arises from their depleting and revulsive influence.

In *epistaxis*, occurring about the period of puberty, the depletion and revulsion, produced by a common dose of sulphate of magnesia, is often sufficient to put a stop to it.

In the treatment of *hemoptysis*, the use of cooling purgatives has also been found beneficial, especially in the interval of the attacks. Should we be able to connect the hemoptysis with the suppression of an habitual discharge, as that of the hemorrhoidal or menstrual flux, we should by all means endeavour to bring back such discharge; in the former case, by aloetic purgatives and leeches around the anus, and in the latter case, though with more caution, by means of aloetic purges, leeches to the interior of the thighs, and the hip-bath.

In the treatment of *hematemesis*, the continental physicians are loud in decrying the use of purgatives. British practitioners, however, more especially since the appearance of Dr. Hamilton's work on Purgatives, have placed considerable confidence in active purgation as the best mode of treatment in many cases of hematemesis, more especially when it occurs in young and middle-aged females, and is connected with uterine torpor and a sluggish state of the bowels. Nor is the benefit of this plan of treatment confined merely to sanguine and plethoric individuals; it is equally remarkable in chlorotic and leuco-phlegmatic habits—these observations, however, apply only to females; the injudicious employment of such means in hematemesis proceeding from different causes, as in persons debilitated by organic disease, would be decidedly mischievous.

In the treatment of *menorrhagia*, cooling purgatives are found useful; they both serve to deplete, and they also act as revulsives; the best form is, the infusion of roses with sulphate of magnesia, and about twenty minims of tincture of henbane. In the use of purgatives, however, in this affection, caution is necessary, lest they excite still more the action of the uterus by contiguous sympathy.

In *hemorrhoids*, all irritating or drastic purgatives are to be sedulously avoided, such as aloes and colocynth; at the same time that it is of the utmost consequence to regulate the bowels by effectual but mild aperients; senna, sulphur, and magnesia are the safest for this purpose. The confectio sennæ is much used in the treatment of this affection. The particular object of administering aperients in such cases, is to remove accumulations in the colon, and, by promoting the secretions in the upper part of the canal, to free the portal circulation.

In the relief of *cerebral congestion and inflammation*, purgatives, both by the mouth and in the form of enema, are of the most important benefit; to be effectual, they should be of the most active kind; their use would seem chiefly to depend on their revulsive effects.

In treating *apoplexy*, active purgation is of the most unquestioned advantage. It is found that on first observing the premonitory symptoms, if brisk purging be employed, the attack may be arrested. When the apoplectic seizure has actually occurred, after blood-letting has been practised, active purging is next to be employed; a large dose of calomel, or two or three drops of croton oil applied to the tongue, will often prove effectual; these should be followed in a little time by a purgative enema. When symptoms of depression, as weak, small, and irregular pulse, pallor of the countenance, profound torpor, &c., accompany the apoplectic attack, considerable caution is necessary in the employment of depleting measures; yet, even in such cases, stimulating purgative enemata with turpentine are found useful.

In the treatment of the different forms of *mental aberration*, attention to the state of the bowels is of great consequence; in some cases, where great torpor of the intestinal tube is observed to exist, very active purgatives become necessary.

In the treatment of the different *neuroses*, the practitioner should always attend to the state of the bowels, as the irritation arising from accumulations in them never fails to re-act on the cerebro-spinal system.

In *tetanus*, if the pulse be full and hard, and the system plethoric, brisk purgatives have been found extremely useful, by their removing all sources of irritation from the alimentary canal; they should be repeated, if necessary, so as to produce full evacuation.

In *chorea*, the purgative plan of treatment has been much extolled since the publication of Dr. Hamilton's work on Purgatives. The more drastic purgatives are those chiefly employed by the advocates of this plan of treatment, as calomel, scammony, and jalap.

In *idiopathic epilepsy*, connected with increased vascular action, in which depleting measures are indicated to a greater or less degree, active purgation, by the mouth or in the form of injection, will assist in lessening the general excitement; for this purpose the more drastic purgatives, as croton oil, elaterium, gamboge, scammony, are those to be employed—their use is to be persevered in, till copious stools be procured.

In *hysteria*, when there is reason to suspect that the disease is connected with confined bowels, the use of the compound aloetic pill is strongly indicated. In hysterical females it frequently happens that large collections of fæcal matters are accumulated in the colon; the removal of which is followed by great relief.

In the treatment of *dropsy*, purgatives have been very extensively employed; more especially those of a drastic or hydragogue property, as croton-oil, elaterium, scammony, gamboge, jalap, rhamnus catharticus, and the neutral salts. In the use of such means, however, we must be in a great measure directed by the state of the system in which the dropsy occurs. The purgatives most used in the treatment of dropsy all act in a similar way, viz. by producing free watery discharges, and thus stimulating the functions of the absorbents.

In the treatment of the different forms of *febrile* diseases, there is no class of medicines more valuable, when judiciously employed, nor yet more likely to prove injurious when unseasonably used, than purgatives. In all cases of continued fever, unless where some peculiar contra-indication occurs, it is found necessary to have recourse to cathartics first, for the purpose of removing the contents of the intestines, which, from the injury done to the digestive system in the first instance, must remain undigested, and consequently prove a source of irritation; and, secondly, in order to obviate the occurrence of constipation, to which there is observed to be a very frequent tendency, the peristaltic motion of the intestines being diminished, and their fæculent contents being therefore unduly retained; the combination best adapted for this purpose seems to be a few grains of the pil. hydr., with some of the compound colocynth mass at night, followed by sulphate of magnesia in infusion of senna in the morning. The refrigerant and sedative action of this treatment is very striking.

In cases of typhus, however, where the adynamic state is marked, and comes on early, the practitioner must be more sparing in the use of severe purgatives, and rest content with simple evacuation of the contents of the intestines—otherwise he may run the risk of increasing the exhaustion to a dangerous extent. In cases also where inflammation of the intestinal mucous glands either actually exists, or is threatened, all purgatives, except those of the gentlest kind, are inadmissible.

In all cases where there exists a doubt as to the propriety of using purgative medicines by the mouth, purgative enemata may be resorted to with safety and advantage.

In the treatment of *intermittents*, the same rules apply as in that of the continued form of fever.

In *remittent fever*, purgatives are necessary in order to clear the bowels from the morbid secretions found in the stomach and intestines; these agents, however, should be used with much caution, as considerable harm may be done by their abuse. Violent cathartics are very apt to set up an irritation in the mucous lining of the bowels, which may be productive of serious consequences. By their local irritation they tend to increase the acrid nature of the secretions. The use of cathartic enemata will be found useful adjuncts to purgatives.

In the treatment of the *exanthemata*, the use of purgatives is of decided advantage. In small-pox, at the commencement, or in the initiatory stage, a brisk purge, consisting of three or four grains of calomel, with five or six of the compound extract of colocynth, may be given with advantage to moderate the tumult of the general system. During the maturative stage also, when the pulse is sharp and the skin hot and dry, purgatives must be regularly administered. Should there be evinced during this stage any symptoms of a cerebral nature, brisk purging with calomel and jalap will be found very beneficial. In the secondary fever, also, daily attention to the bowels will be necessary.

In *measles*, gentle purgatives, as calomel and rhubarb, are found sufficient.

In *scarlatina*, purgatives administered with discretion in the early stages are strongly recommended. Calomel with jalap or rhubarb, given at night, and a draught of infusion of roses, with sulphate of magnesia, in the morning, are generally sufficient.

The vast importance of purgative medication is quite sufficient to warrant me in recapitulating its various uses in medical practice, as also in those cases where considerable caution is required in its employment.

Purgatives are beneficial, not only by promoting deficient alvine evacuations and cleansing out the primæ viæ, and especially in cases where there are accumulations in the bowels, which may be recognized by abdominal pain, sense of weight in the knees,[*] pain in the loins, fulness and tension in the abdomen, flatulence, &c., but they also produce good effects by diminishing the quantity of the fluids when in excess, especially in abdominal plethora, or by removing the serous fluids from the system, in consequence of their stimulating action on the exhalants. In the latter capacity they serve as *debilitants—antiphlogistics*. It is from this property that purgatives derive their power of promoting the function of absorption, and hence their use in dropsies. They act, moreover, as powerful derivatives and counter-irritants, especially in head affections, mental diseases, cutaneous affections, and the like.

Some purgatives are capable of exercising a sympathetic effect on the neighbouring organs; and hence, besides their power of removing alvine accumulations, they also are found useful in emulging the biliary ducts and pores.

The milder and gentler purgatives are to be employed in most cases, as being attended with no dangerous consequences, and as being sufficient in cases of constipation. They are more particularly indicated in febrile and other diseases, where violent irritants must be avoided. Violent and drastic purgatives, and especially in strong doses, are only to be selected when active irritants are required in torpid, relaxed, or cachectic states f the system, where large accumulations of tough mucus and olid fæces exist in the intestines, in verminous diseases, ropsy, mental disorder, &c. But several purgatives, espe- ially those of a bitter kind, as aloes, gratiola, &c., may be ound beneficial, when given in small doses, in states of de- ility, in torpor of the intestinal canal, in deficient biliary ecretion, or when that which is secreted is of a bad quality ; in ese cases such medicines are found to possess the property of mproving the digestive functions.

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[*] ’Απυρέτοισιν ἐοῦσιν, ἤν γένηται σιρόφος, καὶ γουνάτων βάρος, καὶ ὀσφύος ἄλγημα, κάτω φαρμακείῃς δεῖσθαι, σημαίνει.

Hippocrat. Aph., Sect. iv. 20.

According to circumstances, purgatives may be combined ith other medicines, which may either promote their action, r obviate any bad consequences arising from them ; as, for stance, in the case of very irritable persons, and in spasmodic ates, with sedatives and antispasmodics ; in dry states, or asmodic contraction of the intestinal canal, with relax- g substances ; and in cases of debility with stimulants and nics.

Previously to the employment of purgatives, it is often ecessary to prepare the body by what some have called diges- ve medicines, so that the intestinal accumulations may be ore easily dislodged.*

They are, generally speaking, best given in the morning, hen the stomach is empty ; and in intermittent diseases dur- g the period of intermission.

The quantity required for producing catharsis may, in many ses, be given all at once ; but in the case of the patient being eak and irritable, and in all cases where it is necessary to oceed with caution, purgatives are better given in divided oses, at longer intervals than in the administration of emetics, ery one or two hours, or even at longer intervals.

After the purgative has been taken, warm or cool drinks, according to the feelings of the patient, may be taken in moderate quantity. When purgation has commenced, it may be promoted according to circumstances by the use of diluents, broth, whey, &c.

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* Τὰ σώματα χρὴ ὅκου ἂν τις βουληται καθαίρεσθαι, εὔροα ιέειν.—Hippocrat. Aph., Sect. ii. 9.

Should too violent purgation take place, it may be checked by mucilaginous remedies, gum arabic, &c.; or by narcotics, aromatic, or astringent substances; or by derivatives.

It is not always advisable to promote catharsis by purgative medicines, as there are circumstances which prohibit their employment, as, for instance, great debility of the patient, great irritability and weakness of the stomach, &c.; in such cases we should have recourse to enemata, which, however, evacuate the contents of the large intestines rather than those of the small. Besides, according to the different circumstances which induce a confined state of the bowels, purgatives should consist of various ingredients, sometimes of irritating, sometimes of emollient, relaxing, and antispasmodic substances, as, according to their various properties, they may be employed to fulfil several other indications besides mere evacuation of the contents of the bowels.

The circumstances which induce the necessity of great caution in the administration of purgatives, are—great irritability of the system, a tendency to inflammation, or an actual inflammatory state of the intestines; insuperable obstructions in these organs; constipation arising from mechanical causes; extreme debility; great caution is also necessary during pregnancy, immediately after delivery, and also during menstruation. In treating the diseases of children, great mischief is often done by the injudicious use of purgatives; in such cases, the bowels become so morbidly irritable by their use that purging is brought on by the stimulus of the ordinary food; hence the materials of nutrition being carried away, marasmus sets in. and death soon follows.

Laxatives.

By laxatives are meant those medicinal agents which evacuate the contents of the bowels without occasioning irritation, or stimulating the exhalants of the tube.

The effects of medicines of this class on the digestive organs would appear to be of a relaxing kind; *leniendo purgant et lubricando*, says Mesué; their use is to weaken and enfeeble for a time the digestive apparatus; we ordinarily see those who use them for the evacuation of the intestines, complain for several days after of slowness in the elaboration of their aliment; loss of appetite, dislike for food, loaded tongue, and diarrhœa, are frequently complained of.

The action of laxatives is not confined to the parts to which they are immediately applied; these substances are taken up by absorption and carried into the system; where they produce various effects according to their qualities; in some cases, they produce emollient effects, as manna, the oils, &c.; in other cases they produce temperant or cooling effects, as tamarinds, &c.; the former class are found peculiarly serviceable in inflammation of the air-passages and urinary organs, whilst the latter are much extolled for their property of cooling the system, moderating febrile heat, &c.

Use.—When in fever we wish to evacuate the intestines, and that irritation or inflammation of the gastro-intestinal surface interdicts the use of irritating purgatives, we are then to have recourse to laxatives.

In inflammations of serous membranes, as in pleuritis, peritonitis, as also in pneumonia and nephritis, the use of manna and of the laxative oils is strongly recommended. In the treatment of verminous affections, castor-oil and almond-oil have been much extolled; they are said first to kill the worms, and then to effect their expulsion.

In irritation of the urinary organs, as dysuria, strangury, and hematuria. Sydenham, who was tormented with hematuria accompanied by acute pains in the loins, found great relief from the use of a solution of manna in whey. Hoffman mentions a case in which he saw a solution of manna in water remove a retention of urine; it procured some evacuations by the bowels, and caused the patient to pass several pints of urine.

EMMENAGOGUES.

Medicinal agents which have the property of promoting or restoring the mentrual discharge.

Medicines of this class are indicated, when the menstrual discharge is absent at the time when it should appear, and when this state, usually called amenorrhœa, occasions distressing symptoms, or when this discharge is suppressed, and bad consequences are either apprehended or have already come on from this suppression, as also when the discharge is scanty and attended with pain and other unpleasant symptoms.

With respect to the means of promoting menstruation, (emmenagogues,) those agents are generally considered to possess this power, which are capable of stimulating the generative organs, and of causing a determination of blood to the uterus. These means are partly external, as warm foot and hip baths, fomentations to the generative organs, steam introduced into the vagina, frictions of the lower extremities, leeches to the labia pudendi, or cupping on the inner side of the thighs, bleeding from the foot, electricity, &c.; and partly internal; among the latter may be reckoned several mild stimulants and tonics, as the herb. pulegii, melissæ, marrubii alb.; rad. aristolochiæ rotund.; and other substances to which the name has been more exclusively applied, as sabina, digitalis, and other diuretics,) aloes, hellebor. nig., crocus, myrrh, galbanum, and other gum resins; borax, ergot, and iodine.

The employment of these several means, which are best applied about the time when menstruation usually occurs, generally requires great caution, and before their application particular attention must be used in investigating the causes of the absence of menstruation, so as to direct our efforts to the removal of these causes. And as the absence as well as the suppression of this discharge may depend on a variety of causes, such as organic disease of the generative organs, debility, plethora, spasm, gastric irritation, &c., it naturally follows, that no plan of treatment can be laid down of universal applicability, but various methods must be applied according to these various causes; sometimes stimulants and tonics are to be given, sometimes antiphlogistic measures, and sometimes antispasmodics are found most beneficial.

When the suppression of this discharge is connected with debility of the system, as often occurs in young women about the term of puberty, the preparations of steel, bark, and other tonics are the most effectual means. When, however, a sudden suppression occurs in persons of a full, plethoric habit, venesection, aperients, and other antiphlogistic measures are indicated.

Active purgatives, whose action is directed chiefly to the rectum, and hence by contiguous sympathy to the uterus, as aloes, have been found beneficial. For the same reason, stimulating diuretics, as cantharides, terebinthinate medicines, &c., have been recommended.

As the means which promote menstruation are observed to possess the power also of promoting the lochial discharge, they sometimes receive the name of *aristolochica.* But the employment of stimulating means with lying-in-women is particularly uncertain; they chiefly consist of those agents which have a tendency to drive blood to the uterus, as warm fomentations over the uterine region, warm injections into the vagina, leeches to the labia pudendi, or, according to circumstances, leeches to the foot, with emollient enemata; here also it is of the utmost importance to adapt the treatment to the various causes of the affection.

ANTHELMINTICS.

Medicinal agents which promote the expulsion of worms from the intestinal canal.

There are four species of these; the tænia or tape-worm, trichuris or tricocephalus, ascaris vermicularis or ascarides, and lumbricoides.

With respect to the removal of worms from the intestinal canal, besides the ordinary purgatives, certain substances called anthelmintics, are sometimes necessary, which destroy or dislodge the worms, partly by their disagreeable smell, their sharpness or roughness, and partly also by some unknown operation. The chief substances possessing this power are, tanacetum, absinthium, nuces juglandis, valerian, rad. filicis, assafœtida, dolichos pruriens, onions, garlic, expressed oils, quicksilver, sulphas ferri, oxide of zinc, tin filings, &c.

In the selection of anthelmintic remedies, due regard must be paid to the state of the body; when there is considerable debility, those anthelmintics must be given which at the same time possess tonic powers; in very irritated states of the nervous system, in case of spasms, convulsions, &c., valerian, flowers of zinc, &c., are indicated, as also oils and other demulcent remedies; in cases where much viscid mucus is present, ammoniacum, antimonials, mercurial preparations, &c., will answer best; in such cases also, alkalies, lime water, &c. produce good effects, by dissolving the viscid mucus in which the worms are imbedded.

Purgatives, as being useful for dislodging worms, as well as the mucus accumulated in the intestines, and which sometimes prevents the due operation of the anthelmintic medicines, have been employed with considerable advantage, either separately or in combination with anthelmintics proper; but if anthelmintics have been employed some time, and the worms have not been brought away, purgatives are then to be resorted to. Jalap, with calomel, is the combination usually employed on such occasions.

It moreover becomes necessary to endeavour to prevent a new generation of worms by strengthening the intestinal canal; to this purpose, bitter, aromatic, and astringent remedies are best adapted, more especially iron, as well as such tonic remedies as are known to possess anthelmintic properties, as absinthium, nuces juglandis. The patient must also adopt such diet as may correspond with this end.

The selection as well as mode of application of the remedies must be directed according to the different species of intestinal worms present. The consideration of this point belongs more properly to Special Therapeutics.

DIURETICS.

Substances, which have the property of increasing the urinary secretions. According to this definition, all those therapeutic agents capable of making a general impression on the system, and of augmenting general absorption, as tonics and stimulants, and thus, though indirectly or secondarily, exercising a marked influence on the proportion of the urine secreted, will in some cases become diuretic, though they may not have a direct action on the urinary passages. Under other circumstances, on the contrary, relaxing and antiphlogistic means, by merely diminishing that irritation of the organs which impairs the function of secretion, will favour and promote that of the urine. Thus, baths, blood-letting, acidulated drinks, are found to act as diuretics in inflammatory and febrile affections. From this circumstance it is that some medical men, considering only the general effects of those substances which promote the secretion of urine, recognise in the great majority of those agents set down as diuretic, mere relaxants, tonics, or stimulants, and question altogether the special action of any medicinal substance on the urinary organs. Still, however, it cannot be doubted that most alkaline and saline substances possess a species of affinity for the urinary passages, and that some of them have the property of exciting the secretion of urine. It is difficult to refuse to nitre, squill, and digitalis, a special action on the kidneys. These different substances present, no doubt, different general effects; but they approach each other very closely with respect to their mode of action on the absorbent system and on the kidneys. They appear to promote the absorption of the fluids effused in dropsy, and it is not till this first effect has occurred, that the fluids so absorbed can be eliminated from the system by the renal secretion. Even though it were admitted that in this case the secretion of the urine is merely passive, (a thing not probable,) and that the kidneys are in a manner forced to afford an exit to the fluids brought to them, still we must recognise some particular force which tends to direct the fluids through this channel rather than through that of the cutaneous transpiration, or the intestinal canal. Now it is a matter of constant observation, that when squill, digitalis, &c. do not irritate the gastro-intestinal organs too violently, they produce a diuretic effect; and this effect takes place even when they are given in the solid form, and though there be no liquid effusion present; so that it must be admitted that this effect depends on an increase in the secreting functions of the kidneys, and that the product of this secretion can only be taken from the mass of liquids circulating with the blood. So then it becomes necessary to admit the existence in certain medicinal agents of a special stimulating power exercised on the kidney, independent of the general influence which they may exercise over the entire system.

All these substances called diuretics do not act in the same way. Some of them, when absorbed by the mucous or cutaneous surfaces, and introduced into the torrent of the circulation, directly stimulate the kidneys, and force them to secrete an increased quantity of urine. Others, as cantharides, colchicum, turpentine, balsam of copaiba, seem to possess more affinity for the excreting organs, and act chiefly on the bladder, and excite secondarily the renal secretion, as every stimulation made on the extremity of an excretory duct increases the secretion of its gland.

We must beware of confounding the diuretic effect, which may be modified by many general and local causes entirely foreign to the diuretic agents, with the diuretic property in itself, which resides essentially only in certain medicinal substances, which have the special property of augmenting the secretion of urine. Indirect diuretics act only on the general system by tonic, stimulating, or relaxing properties, and thus tend to re-establish the flow of urine, as well as that of all the other excretions, by combating the morbid cause which suspends or diminishes its secretion. It is only in a secondary way that they facilitate and promote this secretion.*

Therapeutical use of Diuretics.

Diuretic agents may be employed: 1st, when the secretion of urine is either suspended altogether, or when the quantity secreted is diminished, and also when, whilst it is not very different in quantity from its normal state, the cellular tissue has become more or less infiltrated in these different cases, or there is an effusion of liquids into the great cavities of the serous membranes. It must always be held in recollection that diuretic treatment is merely secondary, and chiefly directed against a morbid symptom. It is then extremely important, before employing diuretics, and even during their action, to direct our attention towards the primary cause of the disease.

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* Certain mental emotions, as fear, &c., are well known to exercise a diuretic effect.

Irritating diuretics, as squill, colchicum, &c., are not admissible in inflammatory dropsies, in those which are the consequence of chronic inflammation, or even in those accompanied by a febrile state, unless antiphlogistics have been previously employed.

Digitalis, remarkable for its sedative action on the vascular system, is chiefly valuable, as a diuretic, in dropsies consecutive on lesions of the heart or large vessels, and accompanied with disturbance in the rhythm of the pulse. According to Woehler,* it is incorrect to class digitalis among diuretics, as he considers its action to consist in removing the cause of the dropsy, the fluid being then carried off in the usual way, so that it is no more a diuretic than quinine given for the relief of dropsies caused by intermittents.

The diseases in which diuretics are employed chiefly, are those wherein there exists effusion of serum into the cavities and the cellular tissue. They are also used with advantage in inflammatory diseases of the skin, and in puerperal diseases, and sometimes also in diseases of the urinary organs, as also in fevers.

Their modus operandi in the cure of dropsies may be readily understood from what has been already stated. By forcing the veins to secrete a greater quantity of urine, they diminish the mass of blood, or deprive it of a part of its serum, since it is it which alone furnishes the materials of this increase of secretion; and in order to repair the losses of this liquid, and to furnish new

* See Muller's Physiology by Baily, Part ii.

materials to supply the demands of a secretion which is incessantly stimulated by the use of diuretics, venous or lymphatic absorption takes place with increased energy, pumps up the liquid from all parts of the body, and causes the gradual, or, as sometimes happens, the very rapid disappearance of large serous effusions

The action of diuretics in diseases of the urinary organs is not entirely the same as in dropsies. Our wish, no doubt, in administering them, is to augment the urinary secretion, but not for the purpose of promoting absorption; it is only that the salts contained naturally in the urine, becoming diluted with a greater quantity of liquid, may act less irritatingly on the diseased parts with which they come in contact. Hence, in such cases, what are called emollient diuretics, considerably diluted, are given with most advantage.

In the treatment of granular disease of the kidney, the use of diuretics is unnecessary, unless where dropsy prevails, or coma is threatened, in connexion with great decrease in the urine. Dr. Osborne and Dr. Bright maintain that diuretics are absolutely contra-indicated in such cases, in consequence of the danger of their adding to the irritation already present in the kidneys. Dr. Christison* does not consider this a sufficient cause of contra-indication; inasmuch as we frequently meet instances in the practice of medicine, where a stimulus of one kind may be employed with impunity, in respect of the presence of irritation of another kind in the same organ. And further, the same writer observes, that diuretics do not increase the albuminous contents of the urine, the quantity of which is generally made a test of the amount of local irritation. Dr. Christison gives it as the result of his own experience, that they may be used in this form of dropsy, without any risk whatever of aggravating the primary disease; it being impossible to remove dropsical effusions so efficiently by any other method. The best diuretics in such cases are digitalis and cream of tartar, both to be employed at once. The decoction of broom-tops also is found effectual in such cases. The efficacy of diuretics, in such cases, is often enhanced by the employment of an emetic, or a brisk purgative.

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* See his work on Granular Degeneration of the Kidneys.

In recapitulation of the uses of diuretics, it may be stated that the irritation of the urinary organs occasioned by such agents may be very useful by counter-irritation, or derivation from other organs, so that those agents frequently effect great and rapid relief, more especially in pulmonary disease. This method of treatment may serve for the removal of noxious matters, sand, small stones, mucus, &c., accumulated in the kidneys and ureters.

The secretion of urine may be promoted by removing the causes which tend to prevent it, as an irritable, inflammatory state by blood-letting, which is often one of the most effectual diuretics, spasm by antispasmodics, &c. Next to frequent drinking or increasing the quantity of fluid in the blood, those means are to be considered as diuretic which excite the action of the kidneys directly, and which, independent of their more general stimulant effect, exert a specific influence on these organs, as juniper, squill, digitalis, colchicum, senega, as also garlic, onion, apium petroselinum, which latter substances, like celery, asparagus, &c., are serviceable here in a dietetic point of view; also, pyrola umbellata, uva ursi, the turpentines, balsam of copaiba, cantharides, acids, carbonic acid gas, carbonated mineral waters, edulcorated mineral acids, as the *spiritus etheris dulcis*, cream of tartar, nitre, and other neutral salts in small doses. The rubbing in also of expressed oils or liniments mixed with diuretic substances on the region of the kidneys and bladder, may promote the secretion and excretion of urine.

Certain precautions are necessary in the employment of diuretics. From the antagonism which is known to exist between the secreting function of the skin and that of the kidneys, it would be well to employ them during the daytime, and the patient should be advised to sit up and keep himself rather lightly clothed during their use. When these medicines are employed during fever, the state of the bladder ought to be carefully attended to every day, as very serious accumulation of urine is found to take place, in consequence of this viscus having lost the power of emptying itself, and the patient not being conscious of the presence of the urine. Like all medicines endowed with special properties, diuretics require two conditions to produce their effects. The first is, that the organ into which they are introduced should be exempt from inflammation, and secondly, that the organ on which they are intended to act after being absorbed should be in a healthy state. Let the stomach be inflamed. and diuretics will increase the inflammation without producing the diuretic effect; or let the kidney be inflamed, and we shall only inflame it still more without increasing its secretion.

In inflammatory states of the kidneys, as also where there is a disposition to renal hemorrhage, irritating diuretics, not only those which are especially exciting, but those salts which are capable of irritating the kidneys in the slightest degree, as nitre, &c., must be carefully avoided.

Diuretics are best given on an empty stomach, after the process of digestion is completed, and their operation may be promoted by gentle motion, cool air,—the loins, hypogastric and pubic regions being in the mean time kept warm.

DIAPHORETICS.

Medicinal agents which favour and increase the cutaneous exhalation.—The means employed for this purpose, if they only promote the insensible transpiration, are called *diaphoretics*;

but if they produce sweating, they are called *sudorifics.* These differ, however, only as to the degree of action. But though it is oftentimes sufficient, and even better, to promote only the insensible transpiration, and it is not always an object to produce directly violent sweating, still where such an effect is considered useful for the removal of disease, it may be promoted by proper and suitable means.

The skin is the organ which secretes the transpiration ; in the healthy state there is a certain proportion between the quantity of the gaseous matter which it secretes, and the other humours excreted ; if the equilibrium be destroyed, and the transpiration be not replaced by an increase in the latter, disease may be the result. In order to keep up this equilibrium, it is necessary that the skin be kept in a proper state, either by moderating its activity when too great, by means of diet, cold baths, blood-letting, &c. ; or by exciting it by friction, warm-baths, and stimulating drinks. Due attention to the state of the skin is so much the more necessary, as on the one hand the derangement of its functions is the source of many of our diseases, and on the other hand sudorific agents act but imperfectly, if it be kept in a foul state, and be not freed carefully from sordes.

The insensible perspiration may be promoted by removing all the circumstances which choke up or stop the mouths of the cutaneous vessels, such as sordes, too great constriction or rigidity of the same, as also spasm, and an irritable inflammatory state, for which purpose washing, bathing, sometimes relaxing, sometimes antispasmodic, and sometimes antiphlogistic remedies are found serviceable.

The diaphoretic method of treatment is serviceable not only for the re-establishing of diminished or suppressed perspiration, and the curing of the diseases occasioned thereby, also for the removal of diseases of the skin by separating noxious materials from it, and stimulating its vessels, but also for the purpose of diminishing the too strong action of the vascular system, and for promoting the crises of inflammatory or violent diseases which may take place through the skin; for removing irritability of the nervous system, spasm, &c.; and, lastly, for diminishing abnormal secretions and excretions, and various affections of other parts of the system, as dropsy, &c.; more especially if such affections have arisen from suppression of the action of the skin.

Whether sweating be spontaneous or artificially excited, it is always preceded by accelerated circulation, a sort of febrile state with congestion of the skin, which becomes swollen, hot, and red. Copious and prolonged sweating is generally succeeded by a feeling of fatigue, which, in acute diseases, is followed by relief more or less marked and permanent. If the sweating be renewed and continued, considerable debility will be occasioned; whence it is that sudorifics may be classed among debilitants in medicine.

With respect to the modus operandi of diaphoretics, we may suppose some of them to produce their effects by increasing the general action of the vascular system, as violent exercise, warm-bathing, alcohol, &c.; some by stimulating the capillaries of the skin, as friction, external heat, &c.; whilst others may be considered to act by imparting tone to the cutaneous vessels, as the cold affusion. Of the powers of this agent we have a striking instance in scarlatina, where, after its employment, we see the function of the cutaneous capillaries, previously distended and debilitated, now restored and re-established, and a copious diaphoresis brought on where the skin had previously been hot and dry. Probably in a similar manner venesection, digitalis, and antimonials, may be supposed to re-establish the cutaneous exhalation by diminishing the injecting force of the heart, and so relieving the over-distended capillaries of the cutaneous surface. The production of diaphoresis by the use of cold drinks is probably occasioned by the sympathy known to subsist between the stomach and skin.

To the class of diaphoretic remedies more especially belong those which accelerate the circulation of the fluids, and occasion a determination of them to the skin, and stimulate the action of this organ. To this end those means will be found serviceable which produce general excitement of the vascular system, as motion, stimulating food, warmth, more especially warm drinks copiously used, and general stimulating medicines, as the *rad. angelicæ*, *serpent.*, &c. Sometimes those agents may be employed which excite the skin locally, as warmth, warm baths, vapour baths, warm fomentations, frictions, warm covering, as flannel, &c., or those substances which act specially on the skin, as *flores sambuci*, *tiliæ*, *chamomillæ*, *herba menth. pip.* &c. *Tartar emetic* in small doses, as well as other *antimonials*, *spiritus Mindereri*, *sal ammoniacum*, *ammonia*, *sulphur*, *camphor*, *opium*, more especially *Dover's powder*, are employed for this purpose.

Bleeding, digitalis, and other sedative agents are often found the most efficient sudorifics, when the secretion of the skin is deficient, as occurs generally in fevers, where the capillaries of this membrane have become incapacitated for the ordinary function of secretion, in consequence of the morbid change produced in their physical condition.

In employing the diaphoretic plan of medication, regard must be had to the general state of the system, as also to the effects produced; it should also be observed that excessive stimulation of the skin may produce over-contraction of its vessels, and therefore impeded secretion and excretion, or even immoderate sweating. Accordingly, when there is great irritability or inflammation present, no stimulating diaphoretics are to be employed, but those only which, without exciting the vascular system, promote the secretion and excretion of the skin, as *tartar emetic* in small doses, *sal ammoniacum*, or *spiritus ammoniæ aromat.* In cases of debility, on the contrary, stimulating diaphoretics are to be selected.

Sudorifics are generally indicated in chronic inflammations of the skin, in rheumatism, gout, pulmonary catarrh, in bowel complaints, and also in dropsy, more especially when occurring as a secondary disease, and preceded and accompanied by granular disease of the kidneys. Dr. Osborne* of Dublin has found diaphoretics eminently serviceable in the treatment of dropsical patients with coagulable urine and dry skin.

Rheumatic and catarrhal affections may often be rapidly removed or avoided, if attacked at their very onset, by diaphoretics. But in violent inflammatory affections, when the disease is as yet, as it were, in a crude state, forced sweating must not be resorted to; it is rather towards the termination that perspiration should be encouraged. It has been observed that the abuse of sudorifics in febrile diseases, besides the debility and morbid sensibility of the skin occasioned by them, may also give rise to petechial eruptions.

Diaphoretic medicines should not be taken on a full stomach, but only when the process of digestion is fully terminated, and accordingly they are best given in the early part of the day. After they have been taken, and there seems to be a disposition to sweating, moderate warmth and keeping quiet in bed are useful, as also copious tepid drinks; on the contrary, keeping too hot, which occasions exhaustion and other bad consequences, as also keeping too cool, which prevents or suppresses perspiration, must be avoided. After sweating is entirely over, the body should be carefully dried.

Excessive and long-continued sweating may be moderated by diminished temperature, cool air, light covering, and, according to circumstances, by the mineral acids, and tonic medicines. Too much caution, however, cannot be used in repressing perspiration.

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* See his work on Dropsies.

EXPECTORANTS.

Medicinal agents which possess, or are supposed to possess, the property of increasing the secretion from the pulmonary mucous membrane, and of favouring the expulsion of substances contained in the air-passages.

The secretion of the sputa and their expectoration, two things are sometimes confounded, may be promoted or facilitated by different and sometimes entirely opposite means, according to the state of the organs concerned. Those medicinal agents, however, ordinarily resorted to on these occasions pass by the common name of expectorants.

In the great majority of cases, the difficulty of expectoration, or the absence of the secretion of sputa in diseases wherein this secretion would be favourable, may depend on the morbid state of the organs which furnish it ; so that the expectoration follows the different phases of this morbid state, and is modified by the different medicinal treatment by which such state is itself modified. Thus, in acute inflammation of the lungs and bronchi, emollient means and the antiphlogistic treatment applied to these organs are the best and the only *expectorants.* It is in this sense, that according to the opinion entertained of the nature of the local affection in which the expectoration is difficult, and according to the idea attached to the state of the strength in general, as capable of interfering with the secretion and excretion of the sputa, such as weakness of the respiratory muscles, atony of the lungs and bronchi, that we see introduced into therapeutics, emollient, tonic, stimulating, and narcotic expectorants. It may, however, be very fairly asked, whether there exist medicinal substances, which, independently of the state of the organs, in the physiological or healthy state, for instance, promote by a special property the bronchial secretion and the movements of expectoration. With the exception of emetics, given either in a full dose, or merely in a nauseating dose, this question is of very difficult solution. When emollient, gummy, or oily substances are supposed to act in this way, it is probably by diminishing bronchial irritation, Stimulating medicines, as squill, colchicum, gum-ammoniac, polygala, the different antimonial preparations, and among the rest, kermes, may probably promote or facilitate the excretion of the sputa, by causing a copious secretion from the bronchi, and thus diminishing the viscidity of those adhering to or obstructing these canals; but in disease of the lungs, where expectorants are given, the action of the substances is confounded too much with the effect of other treatment to allow us precisely to distinguish and determine this action, and it is probably more by traditional empiricism than by an accurate appreciation of their properties, that certain medicinal agents are daily employed under the title of specific expectorants.

There probably exists no class of medicines which so fully establish the truth of the principle, that medicines are but relative agents, as the class now under consideration. In some states of the pulmonary organs, decided antiphlogistics, venesection, counter-irritants, diaphoretics, and those other means by which the capillaries of the lungs are relieved, and their secreting functions are restored, are the most effectual expectorants. In other cases, again, where the secretion of mucus is excessive, where the blood is imperfectly aerated, and there is great prostration of muscular and nervous energy, after the use of emetics, by which the excessive quantity of fluid poured out is discharged by exciting the action of the expiratory muscles, the stimulating expectorants, as squill, and polygala, combined with ammonia, the balsams, myrrh, and other gum-resins, are the expectorants indicated. In such cases, also, the use of tonics is found beneficial both for restoring the strength of the system generally, as well as to constringe the dilated and debilitated vessels of the part.

Therapeutical use of Expectorants.

In bronchitis, after free secretion from the bronchi has been fully established, more especially if it be more or less opaque, expectorants, even those of a stimulating nature, may be employed with advantage. The decoction of senega, with acetate or muriate of ammonia and tincture of squills, may be added to the solution of tartar-emetic. Should symptoms of increasing debility set in, threatening the patient with inability to expectorate, carbonate of ammonia may be given in the decoction of senega; should the pulse become hard under its use, it should be given up. In the *asthmatic* form of bronchitis, where the depression is great, and the power of expectoration fails, besides the carbonate of ammonia, brandy and æther are also found necessary.

In *chronic bronchitis* some have questioned the expediency of employing expectorants, from an apprehension that they may augment the already too profuse secretion. Some expectorants, however, as ipecacuanha, are supposed to exert an alterative rather than a stimulant action on the bronchial membrane. Ipecacuanha may be given in emetic doses with great advantage, and repeated every two or three days in the chronic form of bronchitis. As an expectorant, it may be given in the dose of a grain or two of the powder, or twenty or thirty drops of the wine combined with squill, colchicum, camphor, and opium. In chronic cough, unattended with purulent expectoration, squill is found very useful; and combined with colchicum, ipecacuanha and a small quantity of opium is very serviceable in quieting the cough and facilitating the expectoration in old persons.

In *bronchorrhœa* or *bronchial flux*, the use of tartar-emetic in large doses has been found very effectual in unloading the air-tubes and preventing threatened suffocation. In this affection the habitual promotion of moderate expectoration by small doses of ipecacuanha and the balsam of copaiba or peru, may sometimes prevent that accumulation in the vessels which proves so distressing.

In *bronchial congestion* the employment of alkalis, from their power of determining to the bronchial surface, as also from their attenuant power, by which the viscidity of the bronchial secretion is diminished, is found beneficial.

In *hooping-cough* antimonial expectorants are indicated. In the second stage of this disease, a sedative may be added to the expectorant to diminish the violence of the paroxysm.

In *pneumonia*, after the employment of antiphlogistic remedies, and when the disease has now reached the second stage, considerable benefit may be derived from antimonial expectorating mixtures to which an alkali has been added. When the disease, however, puts on the typhoid form, stimulants and tonic expectorants are called for; in such cases, musk in doses from twenty-four to thirty grains has been highly extolled by some of the continental practitioners.

In the prevention of *pulmonary emphysema*, expectorants with alkaline attenuants, and the other means ordinarily recommended for the removal of obstructions to the respiration, are found the most useful. The secretion from the bronchial surface is often excited in this affection by smoking stramonium.

In infancy, emetics are found to be the most efficient expectorants, and the best means of relieving bronchial inflammation. In *phthisis*, also, they prove the most useful palliatives, discharging rapidly a large quantity of secreted mucus, and thus diminishing for a time the irritation within the lung.

The class of stimulants contains several agents which possess much local efficacy in modifying the action of the pulmonary exhalants, such as tar-vapour, chlorine, and iodine ; when these, however, produce irritation and excitement, they are highly injurious.

It is necessary to keep up a moderate action of the skin during the employment of expectorants, lest a determination of blood to the lungs should interfere with their action ; for nearly the same reason, strong diuretics and purgatives should be abstained from.

SIALOGOGUES.

Substances which promote the salivary discharge.

A mode of medicinal treatment closely allied, with respect to indication, to the following, (promoting the nasal secretion,) but one which requires a separate consideration, is the evacuation by the mouth *(apophlegmatismus per os)*.

The name of *apophlegmatizantia per os* was given to those substances which, when taken into the mouth, and either being chewed there, *(masticatories,)* or used as gargles or washes, or in the form of troches, promoted the discharge of mucus and saliva from this part. But those substances which produce a more copious secretion of saliva by a specific action on the salivary glands are properly called *sialogogues*.

Sialogogues, then, are such substances as irritate the salivary glands, and that either by a local action through chewing and sucking, through the application of stimulating substances, as horse-radish, pellitory, tobacco, &c. ; or by exerting a specific action on these parts, as in the case of mercury, which, though applied to the more remote organs, always acts on the salivary glands. Local relaxation by means of emollient washes, gargles, or aqueous vapours, may produce also such an effect on these organs.

As the substances which promote in general the discharge from the mouth, may be serviceable partly in local affections of the mouth or neighbouring parts where such an evacuation is necessary, or in a paralytic state of the tongue, where such a stimulant may be indicated, and partly in affections of other parts accompanied by a suppression of the salivary discharge, so mercurial preparations more especially are employed in certain constitutional diseases, especially syphilis, or in certain obstructions depending on want of action of the lymphatic system; the salutary discharge, however, produced in such cases, does not appear to be beneficial so much by the evacuation; such evacuation is rather a sign of the mercurial action on the system, and is rather the accompaniment than the cause of the good effects produced; this appears from the circumstance that these same diseases may be cured by mercury, even without any salivation being occasioned.

An inflammatory state of the system contraindicates the employment of sialogogues in general, and of mercurials in particular, previous to the use of which venesection is often necessary. In states of great debility also, and in bad digestion, &c., mercurials are to be avoided.

Should excessive salivation be occasioned by these means, mucilaginous and oily substances are to be employed to mitigate the pain and uneasiness accompanying this state; decoctions of mallows also, emulsions of poppy-seeds, &c. have been recommended for the purpose of rinsing and cleansing the mouth; perspiration should be encouraged by means of warm covering and warm baths; opium, and mild astringent gargles, with the cautious use of laxatives, have been found beneficial; iodine has also been found very effectual in such cases.

ERRHINES.

Substances which promote the nasal secretion are in general called *Errhines;* but when they act so violently as to cause sneezing, they receive the name of *Sternutatories*. Various means, however, must be employed according to various circumstances for the promotion of this secretion.

Sometimes, for instance, in those cases where excessive irritation stops the secretion, soothing and relaxing means, aqueous vapour, &c., will prove beneficial.

Secondly, in torpid states of the vessels, &c., good may be accomplished by irritating means, by the local application of warm vapour, or of vapour or fluids, impregnated with some irritating substance. These irritating means are either of a mild character, exciting the nasal secretion rather than sneezing, or of a more active kind, producing violent sneezing. To this class of substances belong soap, various salts, more especially sal ammoniac, calomel, certain aromatic and acrid plants, as herb. marjoranæ, thymi, nicotianæ, lavandulæ, resina guaiaci; rad. asari, hellebore, euphorbium, &c.; which latter substances act most powerfully, and therefore require considerable caution.

The errhine most commonly resorted to is the tobacco plant reduced to powder. This, when applied to the pituitary membrane of the nose, augments the serous exhalation on this surface, as also the secreting action of the mucous cryptæ covering it: the impression made by it on the pituitary membrane occasions sneezing, and gives rise to a considerable discharge by the nose. Certain sympathetic effects also are observed to take place from its use: the excitement of the pulp of the olfactory nerves is extended to the brain; it arouses the vitality of this organ; the intellectual faculties become more active; vision also becomes clearer, &c.

If the use of this substance be too often repeated, and great quantities of it be applied in powder to the internal surface of the nose, the mucous membrane lining the nasal cavities becomes perceptibly swollen ; the entrance of the air through the nares seems more difficult ; the membrane becomes dry, and its exhaling and secreting vessels no longer yield any discharge.

Medicinal substances of this class are employed for the purpose of discharging noxious matters from the nasal cavities or neighbouring parts, as the trachea and lungs ; or for the purpose of re-establishing the nasal secretion in diseases occasioned by its suppression ; or by way of counter-irritation or derivation, in affections of the eyes, ears, as also in obstinate headache, &c. ; and, lastly, to produce sympathetic irritation of the brain, eyes, and ears, respiratory organs, and even of the uterus, in torpid or paralytic states of these parts.

If the habitual use of snuff be attended with a discharge, a discontinuance of it may be attended with bad consequences. According to Cullen, " whenever the nasal discharge has been considerable, the laying aside the custom of taking snuff has been productive of evil."

Inflammatory states of the system, congestions towards the head, and tendency to apoplexy, as also to the neck, chest, &c., sanguineous discharges, pregnancy, and a disposition to miscarriage, injuries of important organs, aneurysms, hernia, &c., contra-indicate the use of strong errhines.

Where the nasal secretion is excessive, and accompanied with violent sneezing, and when the secretion is acrid, it may be checked by inhaling tepid milk, decoctions of mallows, and other mucilaginous substances into the nose, by mild fumigations of benzoin, amber, frankincense, &c., as also mild aromatics, or by derivation by means of blisters, &c.

Warm-bath.

The temperature ranging between 86° and 99°.

Our space will not suffer us to say more on the subject of the warm-bath, than merely to particularise the chief effects produced by it on the system, the diseases in which it is found useful, and those states of the system in which it is contra-indicated.

The warm-bath at first gently stimulates the vascular system, increasing the expansion of the vessels and accelerating the circulation. The pulse at first becomes fuller and more frequent, the respiration quicker—subsequently, however, the pulse becomes more tranquil, the breathing slower: this serves to explain the good effects of the warm-bath in those diseases occasioned by the suppression of habitual discharges. Everything, however, depends on the degree of temperature.

It promotes the secretions and excretions, and among others those of the skin; and hence the striking advantage of the warm-bath in acute as well as in chronic diseases of the skin.

The warm-bath relaxes the solid parts of the body, and above all, the muscular fibre.

It promotes absorption, both on the skin itself, and simultaneously on the other parts of the body; upon this effect, as well as upon its relaxing power, depends the efficacy of the warm-bath in resolving, softening, and dicussing and dispersing obstructions, tumors, and indurations.

It both stimulates and tranquillizes the nervous system. Though the nerves of the peripheric organs are affected in this case most directly and in an especial manner, still its action is by no means confined to these; nothing equalises all discordancies and disagreements of the nervous system, and acts with so calming and tranquillizing an effect, as a warm-bath.

Lastly, in estimating the effects of the warm, as well as in that of the cold-bath, the mechanical pressure of the water must be carefully taken into the account.

Therapeutical effects of the warm-bath.

This bath, the temperature of which ranges from 86° to 99° F., and which produces on the skin an agreeable sensation of heat, is one of the most valuable antiphlogistic means which we possess. The principal physiological effects of the warm-bath, the diminution of the circulation and respiration, the relaxation of the skin, extinction of thirst, the absorption of a considerable quantity of water introduced into the animal economy, the discharge of copious limpid urine, the state of calm, and disposition to sleep, accompanying or following the use of this kind of bath, explain to a certain extent *à priori* the general sedative action of warm-baths in the different morbid cases wherein they are employed; experience, however, is even still more decisive in confirming their peculiar effects. When parts irritated, or inflamed come in contact with the water of the bath, the latter acts as a topical emollient, and diminishes the tension, injection, heat, and pain of the surfaces which are the seat of inflammation. This effect is also produced in organs which are not subjected to the direct influence of the water. These properties of the warm-bath, so favourable, and at the same time so powerful, have caused them to be employed in a great number of diseases.

Warm-baths, by their direct action on the skin, are beneficial in the great majority of papular, vesicular, squamous, and pustular affections of the skin, in the acute or sub-acute state. They are rarely employed in the acute exanthems, unless in those cases where the eruption comes out with difficulty, or has receded, when some internal organ becomes the seat of a dangerous inflammation. The danger, however, of occasioning cerebral congestions, so common in these diseases, very much restricts their employment.

Most of the affections accompanied by general irritation, as also those consisting in local inflammation, frequently require the use of the warm-bath. Inflammatory fevers, attended with aching in the limbs and muscular rheumatism, are treated with advantage by warm-baths. Encephalitis and meningitis, especially in children, in whom they are so often accompanied by convulsions, almost all acute and even chronic inflammations of the abdominal and pelvic viscera, call for the employment of the warm-bath. It is in general proscribed in thoracic diseases, from the dread of certain consequences which may arise from its use. Thus the immersion in the water occasions a difficulty of respiring, which may augment the disease. Besides, should the temperature of the bath be too low, it favours internal congestion ; and if too high, it might, by accelerating the circulation, give rise to internal engorgement. Another reason not less cogent against its employment in thoracic disease is, the great difficulty of preventing the patient from experiencing a sensation of cold on coming out of the bath, no matter what precautions may be taken against such an occurrence, a result more dangerous in those affections than in any other.

The same theory does not hold with respect to inflammations and other affections of the abdominal organs ; in which cases warm-baths are attended with the best effects. Their use in peritonitis has been put beyond doubt, in which disease, as well as in every case, it produces its beneficial results by its emollient and sedative effects, and not by its revulsion to the skin, as M. Broussais would have it. Warm-baths are also found extremely beneficial in the treatment of gastritis and enteritis, as also in nervous colics, spasmodic vomiting, in ileus, and in intestinal strangulation. Inflammations of the mucous membrane of the digestive tube, even when accompanied by diarrhœa and other troublesome symptoms, are effectually combated by the warm-bath.

The use of this powerful agent is still more strongly indicated in inflammation and irritation of parenchymatous organs, in affections of the biliary and urinary apparatus, in hepatitis, nephritis, and cystitis, whether simple, or occasioned by the presence of biliary or urinary calculi; in hepatic, nephritic, and calculous colics, their use favours the expulsion of the calculi in the biliary and urinary ducts, or calms the irritation occasioned by these concretions.

In chronic diseases the use of the warm-bath is sometimes attended with good results. These, we know, are oftentimes kept up or favoured by an inflammatory state, which is in many cases treated beneficially by warm-baths. Such treatment is useful, not only by diminishing the local subacute irritation and the general febrile state, but also by seconding and directing the revulsive action of those stimulating remedies so often employed in such cases. Most of the thermal mineral waters act as common warm-baths; and though their effects have been exaggerated, there can be no doubt of the cures effected by them in many diseases, especially in tumefaction of the liver, and in different engorgements of the abdominal viscera.

The diseases in which the warm-bath has been found most efficacious, or at least most useful, are the neuroses, whether these affections appear to have their seat in the principal organ of innervation, or the symptoms manifest themselves exclusively in different other organs. The warm-bath is one of the most useful agents for calming and subduing hysterical and hypochondriacal affections, and those gastralgic symptoms so frequently connected with those morbid states, as also those palpitations not connected with organic diseases of the heart. This is also the best means, especially in the case of children, to which we can have recourse in cases of convulsions. In those spasmodic states which accompany different diseases at this age, or which form one of their leading characters, as croup and hooping-cough for instance, the warm-bath produces the happiest effects. Mental alienation in the acute form, as also tetanic affections, are almost always treated successfully by the warm-bath.

In acute cutaneous eruptions.—Warm-baths are here chiefly indicated in three cases:

1st, for promoting and facilitating the coming out of the eruption, especially when this is accompanied with spasm, and the skin is dry and hot. For the same reason warm-baths have been employed in the cases of children according to circumstances, in small-pox, measles, and similar acute exanthems.

2d. When nervous symptoms appear after the eruption has come out, or when the eruption has been repelled by some cause. Thus, the warm-bath has been employed in measles—and also in small-pox during the period of suppuration on the occurrence of nervous symptoms.

In metastatic diseases occasioned by suppression and retrocession of chronic cutaneous diseases, as paralysis, difficulty of hearing, chronic diseases of the eyes, &c.

In rheumatic and gouty affections, in order by stimulating the skin to promote critical evacuations by this organ.

In chronic diseases, occasioned by a prevailing erethism, presenting themselves in the form of neuralgic or spasmodic pains, lumbago, face-ache, hysteric spasms, convulsions of children during difficult dentition, spasmodic retention of urine, painful menstruation, or other spasmodic pains occasioned by obstruction or by a morbidly-exalted sensibility of the uterine system.

The warm-bath is also most useful in case of incarcerated hernia.

Having said thus much with respect to the cases in which the use of the warm-bath is serviceable, we shall now briefly point out those cases of disease in which this agent is contra-indicated. It is contra-indicated in diseases of an asthenic character, in scrophulous and scorbutic affections, in persons labouring under chronic diseases, and who are exhausted by profuse evacuations, and in those adynamic states arising from the absorption of pus. Warm-baths are also usually proscribed in the treatment of dropsies by reason of their debilitating effects, and lest the water may be absorbed. They are also contra-indicated in hæmorrhages, even those of an active kind, for fear of increasing the congestion and sanguineous discharge. They are also but little used in the case of old persons whose organic actions are ordinarily slow, the tissues relaxed, the venous system developed, and whose respiratory functions are often impeded by organic diseases of the heart, and by chronic pulmonary catarrh.

In inflammatory diseases of the lungs, or disposition to hemoptysis.

In case of aneurism, or in varicose states of the veins.

In case of great plethora and a disposition to apoplexy.

In sanguineous discharges of a passive kind.

In great relaxation of the muscular system.

In order that we may derive from the use of the warm-bath all the advantages which it may afford, we must pay particular attention to the mode of employing it. We should have regard to the state of the patient, so as to fix the proper degree of temperature; also to the immediate effects produced by the immersion, so as to shorten or lengthen the patient's stay in it; and lastly, to the consecutive effects, so that we may continue or discontinue its use. It too often happens that patients do not stay sufficiently long in the warm-bath in order to obtain all the benefits derivable from it.

Diluents, Emollients, and Demulcents.

By *diluents* are understood those medicinal substances which are capable of giving more tenuity to the several fluids of the system, and of facilitating their circulation, absorption, exhalation, &c.

Diluents consist of watery drinks, generally acidulated, sometimes, also, containing a small quantity of gum, gelatine, sugar, and mucilage ; whey, lemonade, beef-tea, or chicken-broth, imperial drink, and such like, constitute the ordinary class of diluents.

The thickening of the fluids is a fact which cannot be questioned. Whoever will compare the dark, thick blood of a person labouring under organic disease of the heart, or affected with asthma, with the watery blood of a dropsical patient, will be satisfied that there is some foundation for the belief in a morbid thickening of the fluids. This belief will be further strengthened by comparing the consistent, dark-green bile of an icteric patient with the liquid, clear, and almost colourless bile of a person labouring under scirrhous liver.

The necessity for taking diluent drinks is indicated very powerfully in various states of disease. In fever and in all febrile and inflammatory diseases the instinctive desire of cooling drinks is most urgent, and nothing is more calculated to keep up the irritation of the disease than the withholding of them.

The rapidity with which aqueous drinks make their way into the circulation, and the equal rapidity with which they make their escape from the system through the skin, bladder, &c., point out the utility of these simple agents in the treatment of febrile disease, where determination to the skin is so frequently observed to produce a favourable crisis.

Nor is the advantage of diluents confined merely to their diminishing the thickness of the fluids : they are also serviceable by their obtunding their *acrimony*. Thus we may account for their utility in diseases of the alimentary canal, by their diminishing the irritating acrimony of the biliary secretion.

heir power of diminishing morbid elevation of temperature not the least deserving of attention. And this suggests the ropriety of attending to the temperature of such drink. In e cold stage of a febrile disease, the diluent should be warm; the hot, cold, and in the sweating stage, tepid.

Emollients and demulcents. Though these two classes are enerally considered separately, we shall here consider them nder one head, their points of agreement being so very umerous, and their practical application being nearly the same. he characters of substances which come under this division of ur subject are: a power of relaxing the vital tension of the issues, and of diminishing the energy of the organs; such of hem as contain mucilaginous, gelatinous, or oily or saccharine ngredients, possessing the additional attribute of sheathing the arts to which they are applied from all irritating matters. emulcent liquids, in fact, are diluents, with the addition of considerable quantity of gum, mucilage, fixed oil, gelatine, ugar, &c. These several ingredients are soluble in hot or oiling water, and this is the proper vehicle for the preparation nd exhibition of medicines of this class. The temperature at hich they are best given ranges from 78° to 98° F.

Demulcent or emollient remedies are given with the inten- ion of calming the symptoms of excitement and reaction, and ccasionally are used for the purpose of introducing active and crid substances into the stomach, the internal lining of this rgan being sheathed by the demulcent vehicle.

Demulcents are found useful in cases where irritation or in- lammation of mucous membranes exists—thus, in catarrh, they re used to quell the teasing cough, which they are supposed to ffect by their direct action on the top of the trachea, which ction is thence propagated by continuous sympathy to the ntire pulmonary mucous membrane; they are also employed n intestinal irritation and inflammation, as well as in irritation of the mucous membrane of the urinary organs. Demulcents, such as decoction of arrow-root, jellies, and other farinaceous substances, are the best articles of nutriment in diarrhœa and dysentery, as also in convalescence from acute diseases where the digestive organs are not yet adequate to elaborate more solid food. In gonorrhœa, attended with ardor urinæ, demulcents are useful, such as linseed-tea.

In irritation of the rectum, demulcent enemata, as of starch, are often useful; their effects are often extended with advantage to the adjacent urinary organs when in a state of irritation.

Among the external demulcents, or, as they are more frequently called, emollients, the base of which is constituted by the combination of heat and moisture, we may place cataplasms and fomentations, which are found so useful in inflammatory affections.

Blood-letting.

Blood-letting may be general or local; the former consisting of venesection and arteriotomy; the latter of leeching, cupping, and scarifying. With respect to the propriety of blood-letting, certain circumstances call for our consideration; as the nature and stage of the disease—the frequency and force of the heart's action—the state of the pulse—the appearance of the blood, and the effect upon the patient, as also on the disease.

The diseases in which blood-letting is called for, are those either accompanied with inflammation, or in which inflammation may supervene. Thus, blood-letting is urgently required in inflammation of serous and parenchymatous structures; less so in inflammation of mucous membranes. Certain affections of the head, attended with congestion, also require blood-letting.

According to Laennec, the force of the heart's beat under the stethoscope is an excellent criterion to guide us in practising blood-letting.

The state of the pulse at the wrist is that which is usually referred to as our guide in the use of the lancet. This, however, must always be taken in connexion with the disease under treatment. Thus, says Dr. M. Hall, "In enteritis, although an inflammatory disease, the pulse is small and feeble, and would not to the inexperienced suggest the propriety of the essential remedy, blood-letting; in a certain stage of exhaustion from the loss of blood, on the other hand, the pulse is bounding and strong, and the ignorant or incautious practitioner might be led by it to an improper and unsafe detraction of blood."

Generally speaking, a full, strong, and hard pulse, with heat and other symptoms corresponding with such a pulse, are considered as affording the most certain indications of venesection. However, it sometimes happens that, when there exists a really inflammatory and plethoric state of the system, the pulse, in consequence of a spasmodic contraction of the vessels, or by reason of the respiration and circulation being impeded, may present the characters of smallness and even softness, in which cases it becomes freer, fuller, and stronger, after venesection.

The quantity of blood to be taken must be determined by the constitution of the patient, the violence of the disease, and also by the effects of the bleeding. Generally speaking, a pound of blood is said to be the average quantity in the case of an adult; there are cases where this would be too small; whilst on some occasions half the quantity will suffice. With respect to the effects of the bleeding, it has been advised to let the blood flow until the symptoms indicating the necessity of the operation cease, and the full, strong, hard, and rapid pulse becomes softer and more tranquil, and that which was small and oppressed becomes raised and fuller. With respect to this point, however, it is to be observed, that the remission of the symptoms does not always follow immediately, and that even when it does really follow, we are not always to trust in it, as in such cases it may take place for some time, where venesection is not indicated, and where the state of the patient becomes even worse after it. It has been also recommended to allow the blood to flow till syncope comes on. This, however, is an uncertain guide, as many persons faint readily and rapidly, whilst others will not faint for a considerable time; and again, in inflammatory affections, especially of the lungs, syncope has been found to be attended with danger, as, during the suspension of the circulation, the blood may coagulate in the lungs and heart. But where no inflammation exists, and the object is merely rapidly to produce a collapse of the vessels, (as in incarcerated hernia, &c.) venesection may be continued even to syncope.

Whilst the blood is flowing, great attention should be paid to the state of the pulse; if it grow fuller and stronger, it shows the safety and propriety of continuing the bleeding, and *vice versâ*.

When the blood flows freely, and exhibits the ordinary venous hue, the bleeding may be allowed to go on; whilst, if it come tardily, and presents a deep livid hue, great caution is necessary.

Of all the criteria for guiding the practitioner in bloodletting, its effect in inducing syncope is the most important. According to Dr. M. Hall, the rationale of this criterion is this: Every disease appears to possess its own intrinsic virtue in this respect; it is determined by placing the patient erect, and bleeding to syncope: the quantity of blood which flows is the measure of the protective influence of the disease, in one class of cases, and of its influence in superinducing a susceptibility to the effects of loss of blood, in the other.

To assist in distinguishing whether pain be the effect of inflammation or of irritation, the same writer recommends us "to place the patient upright and looking upwards, and bleeding to incipient syncope;" if the case be one of inflammation, much blood flows; if irritation only be present, but little.

In arachnitis and apoplexy, there is a great tolerance of loss of blood, and it is long before syncope is induced, and in these same affections every practitioner knows that much blood must be detracted before the chain of morbid actions can be broken down. The same may be said of pleuritis, pneumonia, and peritonitis—whilst in bronchitis, or inflammation of the intestinal mucous membrane, there is not near such a tolerance of loss of blood, nor is the detraction of so large a quantity at all necessary.

The same guide must direct us as to the propriety of repeating the bleeding, namely, the state of the pulse, the beat of the heart, and the state of the symptoms. The appearance of the buff on the blood, which has been considered as indicating the propriety of repeating the blood-letting, is by no means sufficient as a guide; as this appearance occurs in other states of the system besides those of an inflammatory kind, more especially in almost all puerperal diseases.

The following may be set down as the effects of general blood-letting. First, it diminishes the quantity of blood, and accordingly may remove the tension and loaded state of the vessels depending thereon, the irritation of the heart, vessels, nerves, &c.; as suppressed action and apparent debility, and accordingly may promote or improve the circulation, the secretions and excretions, absorption, &c. In the second place, it may, by abstracting the most important vital stimulus, depress or lower increased vital action, change the quality of the blood, and diminish its excessive plasticity. Also, by being suddenly and copiously abstracted, it may produce a collapse of the vessels, sudden relaxation of the whole system, and also a cessation of spasm. Lastly, it may occasion an increased afflux of blood to the part whence the blood is abstracted, and thereby a derivation* from other parts. The degree, however, of these effects depends on the quantity of blood taken, on the rapidity with which, and the place from which, it is taken; and such effects are so much the greater, the greater the quantity, and the nearer to the heart the place is from which it is taken, and also the more rapidly it is abstracted. General blood-letting, or *venesection*, is probably one of the most important and powerful instruments in the hands of the practitioner, one which may quickly afford relief in the most perilous cases, but one which, if abused, or employed unseasonably, may be attended with the most disastrous consequences, such as extreme debility, and even immediate death.

Venesection is chiefly indicated in a plethoric state of the system, more, however, in order to remove or avoid the bad consequences which may arise from it, than with a view of removing such a state, which object is to be attained by treatment directed to its causes, and by attention to diet, regimen, &c. In the second place, it is indicated where there exists a high degree of general or local inflammation, or other affections depending thereon, as hemorrhages, spasms, &c. In the third place, it may be serviceable, on the principle of derivation, in case of congestions in other parts. Its object is oftentimes to relieve the capillaries of the inflamed part mechanically, by diminishing the quantity of the blood.

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* The power of blood-letting, as a means of *derivation* or *revulsion*, is unquestionable, whatever may be the mode of explaining such power, Some have attempted to account for it on mechanical principles. Others, among whom is Majendie, will have it that such derivative or revulsive power is the effect of the contractile power of the vessels, and the forced state of distension in which they exist during life, causing an afflux of blood to any point where an opening is made; this is quite certain, that a movement in that direction is immediately perceived in all the small vessels which can be brought under the field of the microscope, on a puncture being made in any one of them; Haller distinctly observed that this movement often inverted the natural course of the circulation, and often extended to portions of blood which were stagnating in vessels, and caused globules to separate and become distinct which had previously combined into irregular masses. We have, accordingly, no reason to suppose that similar changes may not take place in the blood stagnated in inflamed parts, when an exit is given to the blood from other parts of the circulating system.

In the treatment of inflammation, our attention must not be directed exclusively to diminishing the force of the heart's action by repeated venesection; as in many cases the sending of local constringents, such as antimonials or mercurials, through the circulation, would have contracted the capillaries of the inflamed part, and stopped the inflammation.

The necessity of blood-letting in idiopathic fevers, accompanied with great prostration and great debility, is not so palpable as it is in local inflammation attended with an equal amount of prostration, as, for instance, in pneumonia, where, in consequence of the congested state of the pulmonary capillaries, the blood sent to the brain and other parts of the system is but imperfectly arterialized; in such a case the importance and benefit of blood-letting are readily recognised; in typhoid fevers, however, the same state of congestion of vital organs existing, the same measure is required to relieve the load by which the system is oppressed.

In symptomatic fever, accompanied with increased force in the pulse, it is often necessary to diminish the injecting force of the heart, which tends to keep up and aggravate the disease; this is done either by venesection or by leeches, which latter, whilst they serve to lower the pulse, at the same time relieve local fulness.

In rheumatic fever, general bleeding is of decided benefit, its effect being not only to moderate the fever, but also to mitigate the severity of the local affection in those parts which already suffer. The amount to be taken must be regulated by the degree of fever present, and also by the strength of the patient. The consideration that there may be necessity to recur to this measure in a more advanced stage of the disease, in consequence of the occurrence of cardiac disease, should warn us from being too prodigal of the patient's resources in the early stage. The cautions necessary to be observed in the treatment of this disease will be noticed presently.

Excessive abstraction of blood produces morbid sensibility, and increased contraction of the heart, each contraction being weaker; hence the fluttering pulse of persons in violent hemorrhage. "The rapidity of pulse and convulsion from hemorrhage are," says Dr. Billing, "a beautiful provision of nature; the heart sends on what little blood reaches it, so as to sustain life to the utmost, whilst the convulsions of the frame help to propel the blood in the veins towards it."

With respect to the place whence blood should be taken, it may be observed that where plethora and a general inflammatory state exist, without any striking local affection, it is a matter of indifference; but in case of the affection being local, it is best to take blood from the vicinity of the part affected, and from vessels closely connected with the same. Where suppression of the menstrual, lochial, or hemorrhoidal discharge s to be treated, bleeding in the foot is most advisable.

The opening of an artery, or arteriotomy, is not very frequently practised, in consequence of the difficulty of compressing it, and in this operation also the desired rapid and copious abstraction of blood may be prevented by the artery contracting too soon. However, opening the temporal artery has been found particularly useful in many severe cases of ophthalmic inflammation, as also in diseases of the brain, cerebral inflammation, violent delirium, &c.

Where there exists considerable debility, a deficiency of blood, a disposition to a diluted and watery state of the fluids, and also where the quantity of crassamentum is but small compared with the serum, blood-letting is contra-indicated. Very fat persons also do not bear it well, and in bilious states of the system it is oftentimes even injurious, and not to be adopted without considerable care. In children and aged persons, as also in pregnant women, venesection was distinctly prohibited by the ancients, but in urgent cases it may be employed beneficially, even with such. Even menstruation, diarrhœa, &c., may not prevent it, if it be otherwise indicated, and it was decidedly erroneous to limit its applicability to the first four days of a disease, as, though in general it is better to have recourse to it in the first days of inflammatory affections, it may be employed, however, as, for instance, in pulmonary inflammation, on the eighth or eleventh day, or even later, with beneficial effects. It may be observed with respect to general blood-letting, that where the temperature of the air is very high, and in hot climates, great caution is required.

In the case of *local blood-letting*, it may be observed that the effect is rather confined to the place whence the blood is taken, and it occasions less general depression of the vital powers than general blood-letting.

It is, therefore, principally indicated in local inflammation and congestion. But if a general inflammatory and plethoric state be connected with the local affection, it must be first diminished or removed by general bleeding; otherwise a greater accumulation of blood may be produced in the affected part by the local abstraction of blood. But where the general inflammatory state has been subdued by venesection, and the local affection only remains, or where the former does not exist to such a degree as to require or admit venesection, local blood-letting is particularly indicated. It may also be employed in local congestion, provided this be not connected with too great debility.

Whilst the principal effect of general blood-letting is on the action of the heart, it is natural to suppose that the effect of local blood-letting, either by cupping or leeches, is of a derivative kind, and it is principally indicated in those inflammations which are not attended with disturbance of the general circulation. In cases, also, of local inflammation, accompapanied by general disturbance of the circulation, after the force of the inflammatory fever has been subdued by general blood-letting, local blood-letting is found a most useful auxiliary.

In case of carditis supervening on rheumatism, repeated local bleedings, chiefly by cupping, are much safer, and attended with more satisfactory results, than bleeding at the arm. In treating pericarditis in particular, general bleeding is likely to prove particularly dangerous from the pressure of the effused fluid on the surface of the heart being naturally most injurious when the blood distending its cavities is subjected to sudden and great diminution of quantity.

The cautions to be observed and the dangers to be apprehended in the employment of blood-letting may be here noticed.

It is scarcely necessary to notice the danger of sudden death from hemorrhage, as such an occurrence is not likely to take place in the hands of a careful practitioner. Sufficient warning is always given to indicate the necessity of stopping the bleeding, as also the impropriety of repeating the operation. The symptoms of syncope will suffice for the former, whilst the signs of general debility, and enfeebled circulation, as indicated by excessive smallness and great compressibility of the pulse, dryness of the mouth, &c., will serve to point out the latter. In nervous affections, such as hysteria, blood-letting should be employed with great caution, for fear of aggravating the disease.

Copious and frequent blood-letting is likely to induce a liability to relapses, and a tendency to fresh inflammatory disease.

The kind of inflammation present should always be considered. Thus, in treating scrofulous inflammation by large and repeated bleeding, we run the risk of lowering the system to such a degree as to render it more liable than before to fresh attacks.

In treating rheumatic or gouty inflammation, which we know are both liable to metastasis, we must beware of driving the inflammation too suddenly from the extremities by copious blood-letting, lest it may attack some vital organ.

In treating inflammation complicated with chronic, and more especially with organic disease, considerable caution is required in abstracting blood. We may adduce as examples, the occurrence of pneumonia or bronchitis in persons labouring under disease of the heart, or emphysema of the lung; peritonitis or muco-enteritis in persons affected with chronic disease of the liver, and even dropsical effusion.

In cases of accident, more especially where the head is the part injured, and where the first effects of the injury are a collapse of the vital powers, the employment of blood-letting should be deferred until the powers of life have returned, or a reaction has taken place.

The same remarks apply to the employment of blood-letting during a fit of apoplexy. In such, if the pulse be weak, or small and irregular, the temperature not increased, the countenance pallid or sunk, with profound torpor, blood-letting would be productive of irremediable mischief, at least at the commencement of the attack.

CHAPTER XII.

Derivatives—When indicated—Derivation how effected—Most of the other classes included under this—Difference between revulsion and sympathy—Rubefacients—Sinapisms—Vesicants—Issues and setons—Antacids and Antilithics.

DERIVATIVES.

DERIVATION, or counter-irritation, is said to occur when a local congestion or irritation, or any other affection, is removed from one part, and conducted to another and generally a less noble part. The method of treatment which effects this, is commonly called the derivative or revulsive. This method is especially indicated in diseases which have been occasioned by the suppression of a secretion or excretion, or by metastasis, and also in local congestions, and irritations of important viscera, especially where speedy relief is required, and the original cause cannot be removed by other means.

The derivation may be effected partly by the irritation of another organ, whereby the irritation of the diseased organ is diminished or removed, partly also by relaxing and weakening some one part, where, in consequence of less resistance to the pressure of the fluids, a greater accumulation of them takes place in that part, and a diminution of them in the part affected.

Derivative remedies may accordingly be defined to be those which more especially irritate certain parts, (and they are then called counter-irritants), or which relax and weaken parts, and effect a pressure of the fluids to them, as cutaneous irritants, friction, sinapisms, blistering-plaster, tartar-emetic ointment, issues, setons, the actual cautery, emetics, purgatives, diuretics, and diaphoretics, leeches, cupping, warm-bathing, enemata, &c. Blood-letting has also a derivative effect.

The derivative method is one of the most important in the whole range of medical practice; it may be considered the art of effecting artificial metastasis. It is the most effectual in the treatment of all those diseases which have been occasioned by antagonism or metastasis, and oftentimes holds out the only, or at least the principal, chance of relief: thus, for instance, diarrhœa induced by cold is most speedily and effectually removed by stimulating the skin, and exciting its action, i. e. by diaphoretics. In the treatment also of other topical congestions and irritations of important and vital organs, more especially when immediate relief is necessary, as well as in several chronic incurable diseases, this method affords the best palliative, and the only means of sustaining life. In availing ourselves of it, however, it is of the utmost consequence that we pay attention to the natural consent of certain parts, according to which the therapeutic derivation and counter-irritation may be best selected. Thus we see revulsion takes place most frequently in parts of similar anatomical structure, as when irritation of the skin relieves that of a mucous membrane. Head-affections, we know, are best treated by counter-irritation applied to the stomach and intestines, (purgatives); chest-affections by stimulating the kidneys, (diuretics,) &c.

Numerous instances occur of natural revulsions taking place in the body; that is, instances in which the supervention of one affection removes some other affection previously existing: thus we observe congestion of the capillaries of the brain removed by the supervention of congestion in the hemorrhoidal vessels; sub-acute inflammation of the bronchial membrane often disappears on the coming out of a cutaneous eruption; peritoneal dropsy on the occurrence of diarrhœa. Blisters, issues, setons, and other such methods of treatment, are artificial expedients intended to imitate the curative influence of one diseased action on another. This effect of the revulsive method may be still further illustrated by contrasting it with sympathy; in the case of revulsion we have a secondary affection set up to the exclusion of the primary; whereas, in sympathy we have two diseased conditions mutually sustaining and supporting each other. Thus we see a marked difference between revulsion and sympathy; in some cases, however, the latter favours or rather gives origin to the former, as where the secondary disorder, induced by sympathy, becomes sufficiently intense to extinguish that which called it forth. Sometimes the action which was expected to prove revulsive becomes mischievous by sympathy, as in those cases where inflammatory action becomes aggravated by the irritation of a blister, or where a new morbid action is produced, either in the way of direct sympathy, or through the medium of the excited circulation.

That state of the system, usually called *irritable*, seldom admits of revulsive action, the secondary disorder so induced frequently reacting on the primary. This is peculiarly observable in children, and would seem to depend on the greater irritability of the heart in them. Hence it is, that children are rather doubtful subjects for revellent remedies. Again, should any organ be the seat of irritation or inflammation, we should not select an organ associated with it for the purpose of producing artificial revulsion, as such treatment would be more likely to increase than diminish the original disorder; thus, no one would think of applying a sinapism to the mammæ for the cure of increased action of the uterus, as in menorrhagia; though, in the opposite condition of amenorrhœa, the practitioner will readily avail himself of the sympathy between the two organs.*

The principal instruments of the revulsive, derivative, or counter-irritant medication, have been already considered virtually, though not professedly, under the heads of emetics, purgatives, diuretics, diaphoretics, &c., which are acknowledged to owe no inconsiderable share of their efficacy to the counter-irritation which they cause.

We shall now confine ourselves to the consideration of external counter-irritants. The idea of this mode of treating disease was probably first suggested by Nature herself. We often see obstinate chronic inflammation, more especially of a mucous membrane, disappear on the coming out of a cutaneous eruption. There are various agents of external counter-irritation or derivation employed in the practice of medicine, which, however, differ chiefly in degree. These are rubefacients, vesicants, pustular counter-irritants, setons, and the cautery.

Rubefacients.—The slightest degree of external counter-irritation is that occasioned by rubefacients, and consists in an erythematic excitement of the capillaries of the skin. Moderate degrees of heat, (between 100° and 150°,) essential oils and spirits, the strong alkalis and acids diluted, æther, and mustard, are the chief agents employed for producing this degree of counter-irritation. As instances of remedial agents of this kind, we may adduce cataplasms formed of bread-crumbs or linseed-meal and hot vinegar, with mustard : hartshorn liniment, or an essential oil applied by friction ; pieces of cotton or flannel, wetted with æther or camphorated spirits, and laid on the skin, care being taken to prevent evaporation by covering them. These means are often employed for the purpose of removing slight internal inflammations, and also for moderating those which are more severe. The warm-bath, whether general or partial, as in the form of a pediluvium, with the addition of mustard, may also be considered as belonging to this class of remedial agents; the latter form has been employed with success for the purpose of relieving the brain in fever attended with sleeplessness or low delirium. A galbanum or pitch plaster, rendered still more active by the addition of cantharides, is a rubefacient employed for the relief of chronic bronchitis. Emollient cataplasms may also be considered a species of mild rubefacient. Either in the simple form, or sprinkled with vinegar and applied to the feet, they have been found efficacious in cases of persons of a very nervous temperament, unable to bear more active applications. If continued for some time, they bring out a miliary eruption, which may prove useful in chronic inflammation of the viscera. Cutaneous frictions with the hand, or with a flannel-cloth, or the brush, have been employed for their revellent or counter-irritant effects in chronic rheumatism. Ammonia, camphor, vinegar, &c., are generally added to frictions in order to render them more active. In the treatment of incipient sore-throat, good effects are obtained from the application of the linimentum ammoniæ to the anterior of the neck. Spasmodic affections, especially of the stomach or bowels, various pains and aches, as toothache, earache, are treated successfully with rubefacients, such as hot fomentations, mustard-poultices, &c.

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* Tweedie's *Libr. of Pract. Med.*, Introd.

Sinapisms, or mustard-poultices, are among the most energetic, as well as the readiest rubefacients, and for this reason they are selected, where an immediate local irritant is indicated. These applications, which are formed of flour of mustard and crumbs of bread in various proportions, occasion, a few minutes after their application, a sense of heat, which increases to smarting and burning pain of almost insufferable severity, which can never be endured beyond forty minutes or three quarters of an hour, unless the patient be insensible from some brain affection. A sinapism should never be allowed to remain on beyond an hour, from the danger there is of gangrene supervening. The pain excited by it may be allayed by cataplasms of hyoscyamus or belladonna. Sinapisms are used chiefly in inflammation or congestion of organs coming on during the progress of fever, and sometimes in nervous and spasmodic affections.

Vesicants.—These agents differ only in degree from rubefacients—in fact, many of the latter, if kept on for a sufficient time, are capable of producing vesication. The Spanish blistering flies, or *meloe vesicatoria*, is the best vesicant, and the one generally employed. The active property of this is found to reside in a peculiar principle to which the name of *cantharadin* has been given. The form in which it is best applied is in a compound of the powdered flies with hog's lard, and a sufficient quantity of wax or resin to give it the consistence of soft plaster. This, when spread on leather and applied to the skin, soon excites a sense of heat and pricking in the part, often with ome excitement of the circulation. If removed in a short ime, as in one or two hours, it acts merely as a rubefacient; but if it be allowed to remain on for a space of time varying from five to ten hours, the skin will be raised in the form of a blister filled with yellowish serum. When the blisters have ully risen, the serum is discharged from them by snipping them with a pair of scissors. Hence these agents may be considered s evacuants as well as counter-irritants. It has been observed, hat blisters, in consequence of the absorption of their active rinciple into the system, sometimes produce great irritation, more especially of the urinary organs, causing strangury and ven bloody urine. To prevent this, the copious use of diluent mucilaginous drinks has been recommended. To this Dr. Williams[*] objects; he considers that this practice defeats that part of the good effects of blisters, which depends on their evacuant properties, and reduces them to mere counter-irritants. He proposes to obviate the irritating effects of absorption from a blister, by interposing between the skin and the blistering-plaster a piece of thin gauze or muslin moistened with oil, which, being a menstruum of the blistering principle, conveys its effects to the skin, whilst the gauze or muslin prevents the particles of fly from adhering to the skin, after the separation of the cuticle has rendered it an actively absorbing surface. Six hours is in general a sufficient time for a blister to remain on ; in the case of children, however, little more than half this time is quite enough.

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[*] Cyclop. of Pract. Med., Art. Counter-irritation.

It sometimes happens that from idiosyncrasy blisters produce great irritation ; this, however, may be prevented by adding a little powdered opium or acetate of morphia to the plaster. The local irritation and severe inflammation sometimes occasioned by blisters are best relieved by emollient cataplasms. If a disposition to gangrene follow the application of a blister, stimulating or other applications are to be resorted to.

Blisters should never be applied at the commencement of acute inflammation, nor until the general excitement of the circulation has been lowered by antiphlogistic measures. We have seen that they act both as derivatives and as evacuants.

By their derivative property they draw off the irritation from the affected part, and then remove and exhaust it by the effusion of serum. In the application of blisters we must also beware of placing them too near the inflamed part, lest the sanguineous congestion caused by them may augment the evil they were intended to relieve. In treating the arachnitis of children, this rule is of great importance, as it has been found that the cerebral irritation becomes aggravated by the application of a blister to the cranium or nucha. In treating inflammation of the pleura or of the cerebral membranes, or those of the larynx, it is better to place the blister on some part adjoining, rather than immediately over the affected part. In all acute inflammations, also, large blisters are to be preferred to small ones, the irritation from the latter being nearly as great, without the same good effects. The use of blisters is most beneficial in the treatment of serous and mucous inflammation. In serous inflammation, attended with effusion, the evacuant property of blisters is a valuable adjunct.

Blisters, like rubefacients, have been found useful in certain stages of fever from the stimulus which they impart to the powers of life, as well as by the relief which they afford to internal organs by their counter-irritant and evacuant properties.

In inflammation of the urinary organs, blisters are said to be productive of mischief, in consequence of the irritating effects of cantharides on these organs, when conveyed to them by absorption.

Among vesicating agents may be classed boiling water, which ome have recommended as a sure and expeditious method of aising a blister; it is, however, somewhat unmanageable in onsequence of the diffuse and uncertain character of the nflammation accompanying it, and from its often leading to evere sloughing.

Pustular counter-irritants.—The chief agent for exciting ustular counter-irritation on the external surface is tartar-metic ointment. In order to ensure its good effects as a ounter-irritant, it is advisable that the part to which it is to be pplied should first be stimulated by friction with warm flannel r a flesh-brush, or with strong vinegar. If the ointment be hen rubbed in, it will produce a more uniform and a more ertain effect. If the fullest effect be desired, the friction, both he preparatory and that with the ointment, should be persisted n for fifteen or twenty minutes. When, on the other hand, he slightest effect is desired, mere *smearing* the ointment on he part excited by friction will suffice.

Tartar-emetic has also been used as a counter-irritant in the form of a saturated aqueous solution. This solution should be used as warm as the skin can bear it, as the heat enables the water to dissolve more of the salt, and quickens the effect on the skin. When the part has been prepared by friction as for the ointment, this solution is to be rubbed on gently with a piece of flannel, and continued for a longer or shorter time, according to the effect required. The advantage of this form is, that the pustules leave no mark or seams behind them; its elegance and convenience also render it peculiarly eligible where the ointment might be considered disgusting.

This pustular inflammation is more permanent as well as more effective and energetic in its effects than vesication, and therefore it is that the tartar-emetic counter-irritant is better adapted than blisters in the treatment of deep-seated parenchymatous inflammation, whilst blisters are more effectual in those inflammations in which the chief danger arises from serous effusion. In acute inflammation of the lungs and air-passages, this tartar-emetic counter-irritant is a very valuable agent.

In chronic inflammation the good effects of tartar-emetic counter-irritation are more generally acknowledged; as in chronic bronchitis and pertussis; some consider it even capable of retarding the progress of tubercular phthisis. Also in diseases of the joints and of the bones it is found very serviceable. In the treatment of several of the neuroses, where the disease may be supposed to depend on some local inflammation, this agent has been found useful.

Perpetual blisters, issues, and setons.—Blisters are kept open by removing the cuticle, and, instead of the ordinary dressing, applying the ceratum sabinæ. Issues are made by effecting an opening in the skin, either by incision, by a blister, or an escharotic, such as potassa fusa, or nitrate of silver, and introducing some foreign body, as a pea or a glass bead, into it, which keeps up the irritation and forms a permanent ulcer. In effecting this by caustic, it is necessary to limit the operation and defend the adjacent parts by a piece of adhesive plaster, with an aperture in it of the required size of the ulcer. A bit of potassa fusa placed in this aperture will, in the course of four or five days, form an eschar. This eschar being dressed with some stimulating ointment, begins to detach itself and to secrete pus in the course of four or five days, and then falls off, leaving an ulcer behind it.

Setons are established by passing a lancet-bladed needle, with some thread or silk attached to it, through a portion of the integuments, (pinched up between the finger and thumb,) so that the threads are left in, with the ends hanging out at each orifice. In order to increase the irritation, the thread is rubbed daily with the unguentum resinosum, and shifted or removed to keep the wounds open or discharging. Should the inflammation be too intense, poultices may be employed to moderate it.

The counter-irritants now described are found useful in chronic inflammation of various kinds. In their more moderate form, when they secrete merely serum and not pus, they act rather as evacuants, and have been compared to a new secreting gland in the system. Hence they have been considered as valuable prophylactics against apoplexy and palsy, and as useful adjuncts in the cure of long-continued cutaneous disorders, preventing any ill effects from the suppression of the natural counter-irritation.

Cauterization.—By cauterizing counter-irritants are understood all those operations in which heat is applied as a counter-irritant, in such a degree as to cause disorganization of the part. The common effect of all is the formation of an eschar surrounded by inflammation. Besides the effect of the local inflammation thus excited, and the suppurative discharge following, there appears to be another peculiar result from the application of intense heat, namely, a strong impression or shock on the nervous system, which is often attended with salutary influence. Instruments of iron or of copper, heated to different degrees of incandescence, are sometimes used to produce local irritation and sores. This is called the *actual cautery*, and has been found useful in checking violent convulsive diseases, as epilepsy, hysteria, and local spasms.

Cauterization by substances in the state of combustion has been employed to some extent in the form called *moxa*. For this method we are indebted to the natives of Japan, where moxas are made of a down obtained from the leaves and tops of a species of artemisia made into a cone, which, when lighted, burns spontaneously. The material employed in Europe for moxas, is cotton rendered downy by carding, and made into a roll an inch long, and from half an inch to two inches in diameter. This is held by a forceps or wire, with one end in close contact with the skin, whilst the other is set on fire, the adjacent parts being protected by wet pasteboard or linen. The gradual manner in which heat is communicated to the part by the moxa, causes it to penetrate more deeply than other forms of actual cautery; hence its value as a remedial agent in deep-seated inflammation—in diseases of the spine—in scrofulous and rheumatic swellings of the joints—in chronic diseases of the liver, kidneys, and other internal organs—and in paralysis and neuralgia.

Antacids and Antilithics.—Substances which are capable of correcting morbid acidity of the stomach and primæ viæ, by combining with the acid and neutralizing it. The alkalis, both the fixed and the volatile, as also the absorbent earths, are the substances which are capable of exerting this power. These may be administered for this purpose either in their simple state, or in the state of carbonate. When the alkalis are employed, the state of bicarbonate is generally selected, if flatulence be not present, as in that state they are less likely to debilitate the powers of the stomach. The rationale of the action of this class of medicines is simple enough. They combine with the acid, whose presence is the cause of the morbid symptoms, and form with it a new compound, the action of which depends on the nature of the substance employed; in the case of magnesia, a slightly aperient salt is formed, whilst a salt of opposite properties is formed by lime.

In certain cases of squamous skin-diseases, which have been supposed to depend on the presence of acidity, the liquor potassæ has been found effectual. At the time when acidity of the humours was supposed to give rise to all the diseases of the body, antacids were universally employed. When, in infants, diarrhœa is occasioned by the presence of acidity, chalk is the antacid found most effectual.

From what has been said, it is clear that medicines of this class are merely palliatives, and that the most effectual mode of curing the disease and correcting the tendency to the morbid formation of acid, is by giving tone to the stomach by dietetic and medicinal measures. Antacids are also employed in case of poisoning by acids.

Antilithics.—In the treatment of the lithic acid diathesis, characterised by the deposition of lithic acid and the lithates, the most advisable plan to pursue is to alter the state of the system by lowering its tone by blood-letting and active purgatives. Local bleeding, by means of cupping from the lumbar region to the extent of eight or ten ounces, will answer every purpose. This should be followed immediately by a purgative dose of calomel and antimonial powder, the action of which is to be promoted by taking, at the interval of two or three hours after, three or four drachms of the soda tartarizata in infusion of senna. These medicines should be repeated till the bowels are completely unloaded. In the mean time the patient must confine himself to slops and light farinaceous food for several days. Effervescing draughts also,—half a drachm of the bicarbonate of potash or soda, saturated with fresh lemon-juice, may be taken with considerable advantage three or four times a day.

By following up this treatment, the high tension of the system will be lowered, the pulse will be reduced in force and fulness, the alimentary canal will be unloaded, and the urine, from being strongly acid and deeply coloured, will become pale in colour copious in quantity, and neutral or even alkaline in its reaction.

There is another, and a truly specific plan of treatment, which must not be neglected in the lithic diathesis. This consists in the exhibition of the alkaline bicarbonates in a state of large dilution. From half a drachm to a drachm of the bicarbonate of potash or soda, dissolved in from three quarters of a pint to a pint of thin mucilaginous fluid, should be taken two or three times a day according to circumstances, at periods as remote as possible from those at which meals are taken. The hot springs of Vichy are found to contain more bicarbonate of soda than any other of the mineral waters. The waters of Carlsbad, Seltzers, Pyrmont, &c., possess the same qualities, only in different degrees; two or three glasses of the Vichy waters, taken at intervals in the course of the day, are found to keep the urine in a neutral or alkaline state. If removal from home to these watering-places is inconvenient, their place may be supplied by dissolving the bicarbonate of soda or potash in a convenient quantity of barley-water, or in simple water impregnated with carbonic acid gas. Fifteen or twenty grains of the bicarbonate, dissolved in two ounces of water, having a half-pint bottle of common soda-water poured over it, makes a very agreeable artificial mineral water.

In treating the phosphatic diathesis, or that disturbed state of the constitution which is accompanied by the secretion of phosphatic urine, the endeavour of the physician must be to restore the tone of the system, which will be found constantly to have suffered in a greater or less degree ; whilst the irritable state of the kidneys and urinary passages, which invariably form so marked a feature in the disease, must be allayed. The regulation of the diet is of the utmost importance. The food should be of the lightest and most nutritious kind, such as farinaceous articles prepared with milk ;—white fishes, or whiting, haddock, sole, and white meats from the poultry-yard, are usually recommended ; sometimes, however, a slice of roast or broiled mutton. Tea must be renounced. Large quantities of fluids of any kind are to be avoided in states of the system accompanied with a deposition of the phosphates. With respect to medicines, the bowels should be kept gently open by a combination of rhubarb and aloes, or castor-oil. Opium is another and most valuable auxiliary in the treatment of that state of the system accompanied with a too copious deposition of the phosphates. After having quieted the excessive irritability of the system by opiates, and provided against its recurrence by open bowels, regulation of diet, &c., we may then commence the use of tonics, such as bark, columba, gentian, the preparations of iron, and the mineral acids. One would be led to suppose, from the success attending the alkaline treatment in the lithic acid diathesis, that the treatment by acids was that which would correct the alkalinity in phosphatic gravel. Such a supposition, however, is erroneous ; for the use of acids in cases of phosphatic gravel is not found generally to neutralize the alkaline state of the urine, and still less to render it acid in its reaction. Still the use of the nitric and hydrochloric acids is found to have the effect of diminishing the deposit in the urine,--an effect which must be ascribed to their action as tonics on the system, by improving digestion and strengthening the constitution. By analogical reasoning it was concluded that, in phosphatic gravel, alkaline remedies must prove injurious; and this conclusion has been found to be in some degree correct, since the caustic alkalis and their carbonates seem rather to aggravate the disease. However, it is now ascertained, that if the alkalis be taken in the form of acidulous bicarbonates largely diluted, for instance, of a natural alkaline water, such as the mineral water of Vichy, they will correct the phosphatic diathesis, remove phosphatic deposits, and greatly relieve the patient's sufferings. Petit and Chevallier have confirmed these results with respect to the effects of the water of Vichy in dissolving phosphatic as well as lithic calculi. The bowels should be carefully attended to, and generally speaking, the neutral salts are the best laxatives, from their tendency to increase the quantity of urine.

The treatment of oxalic gravel differs not essentially from that laid down for lithic gravel; regular exercise, moderate living, and the use of the alkaline carbonates, with warm clothing and occasional warm baths, constitute the chief articles of treatment. All kind of food containing oxalic acid, as sorrel, should be avoided. Dr. Prout suggests that it may be advantageous to endeavour to convert the oxalic into the lithic diathesis, which he thinks may be accomplished by means of hydrochloric acid; by these means he considers that a known disease, amenable to practice, is substituted for an obscure one, whose treatment is but little understood.

Urinary calculi.—When gravelly concretions attain such a size as to remain for a length of time or permanently in the kidneys, bladder, or urinary passages, the disease is called calculus. The transition from gravel to calculus is gradual, and the one is frequently united with the other. They are both closely allied in all their relations; they originate in the same causes, and are composed of the same ingredients, and they both require the same kind of treatment; the resemblance even here only ceasing when the surgeon is called in to the aid of the physician.

Calculus in the kidney is to be treated in the same way as gravel; the alkaline bicarbonates, much diluted and surcharged with carbonic acid, should be employed; diuretics are useful by increasing the quantity of urine; the warm bath is serviceable for removing fits of suffering; the diet should be carefully regulated; blood should be occasionally taken from the loins by leeches or cupping.

Calculus in the bladder is generally considered to be a disease to be removed only by surgical interference. In every case, however, much may be done to retard the progress of urinary calculus, and to relieve the patient's sufferings by treatment purely medical. So far as regards the correction of the diathesis, the treatment of vesical calculus, the arrestment of its further growth, and the mitigation of suffering, is the same as that already given for urinary gravel. The method of treating urinary calculus by solvents has been for some years engaging the researches of medical men. These solvents may be administered either by the mouth, or by injections into the bladder. In cases of lithic calculus, the bicarbonate of soda, given to the extent of three, four, six, or eight drachms per day, largely diluted with two or three or even four pints of water, or in the form of a natural mineral water, as that of Vichy, is the solvent generally preferred. In phosphatic calculus, the nitric or hydrochloric acid, considerably diluted, has been considered the most effectual solvent. It has been found advisable, however, to give up the use of acids almost entirely, as they sometimes seem to do harm, by merely changing the diathesis and leading to the substitution of the lithic for phosphatic deposition; it has moreover been ascertained that the phosphatic diathesis is not aggravated by the alkalis, when properly administered, and that their bicarbonates largely diluted will correct the diathesis, and dissolve calculous concretions even more effectually where the deposit consists of the earthly phosphates, than where it is composed of lithic acid and lithate of ammonia. The only varieties of calculi which the alkaline bicarbonates are not likely to dissolve, are those composed of phosphate, or oxalate of lime; even then this remedy, if it do no good, can do no harm.*

The attempt to dissolve calculi by injections into the bladder has of late years received some encouragement from the example of Sir Benjamin Brodie. He has proved that a mixture of two minims and a half of nitric acid in every ounce of water may be injected with safety, even into a tender, irritable bladder; and in one instance he accomplished a cure by using an injection of this strength for fifteen or thirty minutes every two, three, or four days.

There is another mode of treating calculi, to which some have looked with considerable confidence as one likely to affords a means of breaking up and removing calculus in the bladder; this mode is galvanism. It is proved that calculi, especially phosphatic, if included between the points of the conductors of a galvanic battery, may be gradually broken down and reduced to the state of sandy gravel. The experiment was actually instituted by MM. Prevost and Dumas some years ago, by introducing a calculus into the bladder of one of the lower animals between the conductors of the battery; the calculus was eventually broken down and destroyed, without any injury, or even any great pain.

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* For ample information on calculous affections, the reader is referred to the elaborate and practical work of Dr. R. Willis on Diseases of the Urinary Organs.

TOXICOLOGY.

GENERAL SYMPTOMS OF POISONING.

When a person in perfect health is suddenly attacked after having taken food, or drink, with violent pain, cramp in the stomach, nausea, vomiting, convulsive actions, and a sense of suffocation, or when, under the same circumstances, he is seized with vertigo, delirium, or unusual drowsiness, there is every reason to suspect that he has taken poison.

Poisoning may be distinguished from a sudden fit of apoplexy, by the stomach and throat not being affected in the latter.

Division of Poisons.

Christison's division has been here adopted, viz. into Irritants, Narcotics, and Narcotico-acrids.

Symptoms caused by Irritant Poisons.

They are those of violent irritation or inflammation of the alimentary canal. When the irritant is also corrosive, the mouth is affected, pricking or burning of the tongue, redness, swelling, and ulceration of the tongue and palate and lining membrane of the cheeks. The throat and gullet are affected with burning pain, sometimes with constriction, difficulty of swallowing, and redness.

The stomach most constantly suffers; there is acute, burning pain of that viscus; sickness and vomiting; abdominal tension, and swelling. The matter vomited consists first of the natural contents of the stomach; then of tough mucus, often streaked with blood and mingled with bile. Those irritants which are corrosive, affect the stomach instantly, as also when the irritant is very soluble; but the insoluble irritants do not act sometimes for half an hour, or even a whole hour. The intestines are generally affected with burning pain over the entire abdomen—this pain is sometimes pricking or tearing, and frequently of a twisting or intermitting kind, like that of colic. There is generally purging, rarely constipation, frequently tenesmus—pulse quick and feeble—great prostration, and cold and clammy moisture of the skin.

TOXICOLOGICAL TABLES:

EXHIBITING THE SYMPTOMS OF POISONING, THE ANTIDOTES FOR EACH POISON, AND THE TESTS PROPER FOR THEIR DETECTION.

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
ACIDS (mineral) ——Sulphuric	A sense of burning in the mouth and throat—acrid eructations—excruciating pain in the stomach — lips shrivelled, presenting a whitish, yellowish, or brownish appearance—the same appearance may be observed on the tongue and inside of the mouth—matter vomited brown or black—hiccup—costiveness or bloody stools—tenderness of abdomen — dysuria — laborious breathing—pulse weak—extremities cold and clammy.	The copious and immediate use of mixtures of *chalk* or *magnesia* with milk, or solution of *soap* in water.	*A. Sulphuric*—*Nitrate of Baryta* in solution gives with it a white precipitate insoluble in nitric acid—this is sulphate of Baryta.
——Nitric			*A. Nitric*—best recognised by its effect in destroying the colour of *sulphate of indigo*, when heated with it in a tube.
——Hydrochloric			*A. Hydrochloric* — detected by the addition of *nitrate of silver*, which throws down insoluble hydrochlorate of silver.

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
ACID—Oxalic.	Tongue and gums red and inflamed. Burning pains in mouth, throat, and stomach—cold clammy sweats—sometimes a vomiting of dark bloody matter, and sometimes violent purging. Pulse becomes faint and fluttering, and heart becomes paralyzed—torpidity—great sinking—and exhaustion.	Instant evacuation of the stomach, and the exhibition of *chalk* mixtures.	1st. *Hydrochlorate of Lime* gives a white precipitate (oxalate of lime) dissolved on the addition of a drop or two of nitric acid, and not dissolved on the addition of a little hydrochloric acid. 2nd. *Sulphate of copper* gives a *faint bluish* or *greenish white* (oxalate of copper) precipitate not dissolved on the addition of a few drops of hydrochloric acid. 3rd. *Nitrate of Silver* gives a dense, white precipitate, which collected, dried, and heated, becomes brown on the edge, then fulminates faintly and is dispersed.
ALKALIS. *Potass, Soda, and their Carbonates,*	Acrid, burning and urinous taste in the mouth—deglutition difficult and painful—lining membrane of mouth destroyed	1. Vinegar or lemon-juice. 2. Fixed oil, as almond oil, or olive oil, which	*Potass* (caustic)—soapy feel—very deliquescent and very soluble, the solution having a strong alkaline reaction.

	SYMPTOMS.	ANTIDOTES.	TESTS.
	—violent vomiting, often of blood — and pain in stomach with tenderness of abdomen—cold sweats—hiccup—tremors and twitches of the extremities—in a little time violent colicpains with bloody stools.	converts the alkali into a soap.	*Carbonate of potass* gives out carbonic acid gas on adding a stronger acid—its solution precipitates *yellow* with the *chloride of platinum*. *Soda*, carbonate of, *easily crystallized*—not so carbonate of potass. The salts of soda unaffected by chloride of platinum—*acetate of soda* permanent in the air—acetate of potass deliquescent.
Nitrate of Potass	Severe pains in the stomach and all over the body, soon followed by chilliness—sometimes symptoms of the most violent cholera—vomiting and purging of bloody matters. Convulsions and twisting of mouth—failing of the pulse at the wrist, and a tendency to faint a little before death.	Stomach-pump—a brisk emetic, such as sulphate of copper — plentiful draughts of tepid water or some bland fluid to assist vomiting.	Enlivens the combustion of burning fuel—yields nitrous fumes, when heated with strong sulphuric acid—its solution is precipitated yellow by chloride of platinum.

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
AMMONIA and its SALTS	Symptoms resemble those produced by the fixed alkalis, potass and soda, with the addition of a pungent, suffocating sensation from the ammoniacal vapour—intense bronchitis is occasioned by the excessive use of ammonia as a stimulant to the nostrils.	*Vinegar* should be instantly administered, or, for want of it, *lemon juice*, or some vegetable acid—when an excessive quantity of the vapour is inhaled, the vapour of heated vinegar should be inhaled.	Its pungent odour will distinguish ammonia from other fluids—*Carbonate of ammonia* is precipitated by the salts of lime, which distinguishes it from the pure liquid ammonia. *Muriate of Ammonia* is known by the effect of caustic potass and nitrate of silver, the former disengaging an ammoniacal odour, and the latter causing in a solution of the salt a white precipitate, chloride of silver.
SULPHURET OF POTASS.	Burning pain and a feeling of constriction in throat and stomach—vomiting, at first sulphureous, then bloody, is occasionally observed, as also convulsions; the air of the chamber being infected with the odour of hydrosulphuric acid gas—death, preceded by extreme faintness, has occurred in about 15 minutes.	Chloride of soda or lime.	Greyish, greenish, or yellowish colour when solid—the odour of hydrosulphuric acid gas disengaged from it by the mineral acids.

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
ARSENIC and its Combinations	Nausea and vomiting—intense heat and pain in the stomach—purging—intense thirst—severe spasms in extremities and trunk—great prostration of strength—pallor of the face—weak pulse; death sometimes preceded by convulsions.	Stomach pump—vomiting should be excited by tickling the throat with a feather, and also by filling the stomach with warm or cold milk, sugared water, linseed tea. The antidote now most valued is the recently prepared *hydrated peroxide of iron* promptly administered in large doses — *lime-water* may also be tried.	1st. *In the solid form*, it (white arsenic) should be reduced to the metallic state by introducing it, with charcoal powder, into a small tube, and applying gradually the heat of a spirit-lamp; this will yield a blackish, shining, metallic crust, the interior of which is crystalline—a portion of this, exposed to heat, gives out the alliaceous odour. When the white oxide exists *in solution* in the contents of the stomach, the liquid must be first clarified, and the following tests may be applied: — 1st. A stream of *hydrosulphuric acid gas* throws down a *bright yellow precipitate*. 2nd. The *Ammoniaco-nitrate of silver* causes a *yellow precipitate*, which soon fades to a *brown*. 3d. *Ammoniaco-sulphate of*

NAME.	TESTS.
	copper yields a green precipitate. Any of these precipitates heated with black or soda flux in a glass tube will afford the metallic crust. Marsh's test consists in throwing some of the suspected fluid into a mixture of one part of sulphuric acid and six of water, and some pure zinc being added, in setting fire to the gas as it issues from the jet, and holding over it a plate of glass; if there be any arsenious acid present in the fluid, a spot of metallic arsenic will be obtained.

	SYMPTOMS.	ANTIDOTES.	TESTS.
MERCURY. — The mercurial which occurs most frequently as a poison is *Corrosive Sublimate.*	Styptic taste—then a sense of burning in the throat—violent vomiting — violent colic — severe purging — blood vomited or passed by stool—failure of voice—cold clammy sweats over the surface—the perception of external objects is lost, and convulsions close the scene. When either a smaller dose of the sublimate, or a milder mercurial, has been swallowed, after dysenteric symptoms ptyalism supervenes — the fauces may become ulcerated	Whites of eggs, milk, gluten of wheat, should be administered as soon as possible. The secondary symptoms should be treated by antiphlogistic remedies.	Corrosive sublimate when obtained in solution is easily detected by letting fall a drop of the solution on the surface of polished gold, and then bringing a bit of iron in contact with both—a galvanic circle being thus formed, the acid will be transferred to the iron, whilst the metallic mercury will be deposited on the gold. When there is much corrosive sublimate present, we may try it—1st. by *lime-water*, which throws it down of a *deep yellow.* 2nd. by

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
	and gangrene come on, and so carry off the patient—should the person escape death, he may suffer from mercurial palsy.		*alkalis* which form with it an *orange precipitate.* 3rd. by *protomuriate of tin*, which gives a *slate grey powder;* and 4th. by *hydriodate of potass*, which forms a bright scarlet precipitate.
COPPER as in the form of *Verdigris* or diacetate—*Blue vitriol* or Sulphate of Copper.	These resemble those caused by arsenic and corrosive sublimate—there is a peculiar coppery taste in the mouth also—coppery eructations—jaundice—in fatal cases, convulsions and insensibility precede death.	The *whites of eggs.* Iron filings have also been found useful.	1st. *Ammonia* gives to a solution of copper a *blue colour*—2nd. *Hydrosulphuric acid* a *brown precipitate*—3rd. A plate of *polished iron* held in a solution of sulphate of copper soon becomes covered with a *red powdery crust.*
ANTIMONY.—Tartar Emetic.	Violent vomitings—burning pain in the epigastrium, followed by purging and colic—a sense of constriction in the throat—difficult deglutition—violent cramps.	If vomiting has not occurred, it should be encouraged by the patient taking large draughts of warm water, *decoction of*	1st. *Hydrosulphuric acid* throws down a *rich orange-red precipitate*—2nd. *Caustic potass*—3rd. Lime water—4th. *Subcarbonate of potass* throws down a *white precipi-*

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
		bark or *of nutgalls*—when the vomiting has continued long enough, opium will be useful.	*tate*—5th. Infusion of gall-nuts a *dirty white* precipitate.
TIN.—1. The *Bichloride*, called Butter of Tin—and 2, the *Oxide* or worm powder.	Colic—violent purging—in fatal cases somnolency and catalepsy.	Milk—decoction of nut-galls—bicarbonate of soda.	The bichloride of tin affords a rich purple precipitate with deutomuriate of gold—and when strong, it coagulates milk completely.
SILVER. — Nitrate of.	This acts as a local irritant and corrosive.	Common salt in solution	Alkaline and earthy muriates.
Zinc—Sulphate of	Metallic taste in the mouth—sense of strangulation and of constriction in the throat—violent vomiting and purging—pains at epigastrium and over the entire abdomen—dyspnœa—great paleness.	Milk — bicarbonate of soda in solution.	*Hydrosulphuric acid* throws down a *white precipitate.*

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
LEAD—Litharge—Red lead—white lead — sugar of lead—(acetate.)	The symptoms are sometimes those of simple irritation, but more usually those of inflammation combined with the symptoms of lead-colic, sometimes followed by convulsions, coma, or local paralysis.	Use the *stomach-pump*, or give an *emetic* of sulphate of zinc—*Epsom salts* or *Glauber's salts*.	1st. *Hydrosulphuric acid* yields a *black* precipitate — 2nd. *Chromate of potass*, and hydriodate of potass also yield a *fine gamboge yellow* precipitate—3rd. A slip of zinc held in the solution causes the lead to be deposited in the form of a crystalline arborescence.
BARYTA.	Symptoms the same as those of irritant poisons in general—the senses become blunted, respiration very weak, convulsions close the scene.	Sulphates of soda or magnesia.	Sulphuric acid or sulphates—the hydrochlorate of baryta is to be distinguished from the hydrochlorate of strontia by the insolubility of the former in alcohol.
VEGETABLE ACRIDS. Euphorbia, or Spurge — Ricinus, or Castor-oil-tree — Jatropha, or Cassada	The symptoms are those of inflammation of the mucous membrane of the intestinal canal. If the dose be large, *vomiting—diarrhœa — twisting pain of the belly*, with	The poison should be removed by the *stomach-pump*, or by an *emetic* of sulphate of zinc—vomiting should be encouraged by copious	

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
plant — Elaterium, or Spurting Cucumber —Colocynth, or Bitter Apple — Bryony, or Wild Cucumber—Ranunculus, or Butter Cup — Anemone — Stavesacre—Celandine —Marsh Marygold — Mezereon— Savine— Spurge-laurel — Jalap— Daffodil —Manchineel.	*tension*, *fulness*, and *tenderness* — fragments of the plant in the stools—*great exhaustion*—occasionally *giddiness* and *delirium*—the pulse quick and throbbing—*breathing oppressed—tottering gait*, resembling that caused by intoxication — sometimes *convulsions*.	draughts of warm water, sugar and water, or some bland fluid. In case of stupor, very strong coffee both by mouth and in the form of enema—three or four grains of camphor in the yolk of egg. The convulsions should be treated by laudanum—and the inflammation by the usual antiphlogistic means.	
CANTHARIDES.	A sense of *irritation and burning in the throat*, which extends to the œsophagus and stomach—*aversion to liquids* —sometimes *bloody vomiting* —violent pain in the lower	Emetics — vomiting should be encouraged by copious draughts of tepid water —oily and demulcent injections into the blad-	

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
	belly—priapism—strangury with suppression of urine and discharge of blood from the urethra—sometimes violent headache, delirium and convulsions.	der case the strangury --warm bath—leeches and blood-letting.	
NARCOTIC POISONS.—Opium—Henbane—Lettuce-Opium--Solanum—Hydrocyanic Acid.	The general symptoms are vertigo, headache, dimness or total loss of sight—stupor,—palsy of the voluntary muscles—convulsions.		

DIAGNOSIS OF APOPLEXY AND NARCOTIC POISONING.—1st. Apoplexy is generally preceded by certain premonitory symptoms, headache, tinnitus aurium, &c. 2nd. Apoplexy generally attacks old and plethoric persons. 3rd. The symptoms of narcotic poisons come on gradually, those of apoplexy generally set in suddenly. 4th. In the apoplectic stupor the patient cannot be aroused to consciousness; whilst in narcotism the patient may be aroused from the deepest lethargy by shaking, by injecting water into his ear, or by speaking to him in a loud voice.

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
OPIUM.	Giddiness, stupor not preceded by any excitement—insensibility to external impressions—breathing slow—eyes closed	The poison must be removed by stomach-pump, or by an emetic of sulphate of zinc—	

NAME.	SYMPTOMS.	ANTIDOTES.	TESTS.
	—pupils generally contracted —the features soon become ghastly—pulse feeble and imperceptible—the inclination to sleep, at first slight, becomes irresistible — sometimes delirium — muscles become relaxed, and death soon follows. In cases of recovery the sopor is succeeded by a long sleep followed by nausea, vomiting, and giddiness.	cold water dashed on the face may assist the action of the emetic. where the stomach is torpid—in such cases. also tart. emetic may be injected into a vein. The patient should be unabatingly aroused by being dragged between two men, and by repeatedly dashing cold water on his head — internal stimulants, as ammonia, camphor, &c., the injection of water into the ears will serve to arouse the patient—after the entire removal of the poison, *Bleeding* — *Artificial respiration*—*Decoction of galls*—*vegetable acids* —*Infus. of coffee*, not	

		however till the poison is entirely removed.	
HYOSCYAMUS or HENBANE.	Vertigo — failure of speech — pupil dilated — coma — or violent delirium.	The same as for opium.	
HYDROCYANIC ACID.	In small doses, nausea, salivation, pain of head—hurried pulse. In fatal doses, when very large, death is almost instantaneous—when not so large, convulsions are observed to precede death.	Diffusible stimulants as ammonia — chlorine — The inhalation of *ammoniacal* water. The inspiring water impregnated with *chlorine.* Cold affusion.	The *peculiar smell.* *Sulphate of copper* forms with this acid, when rendered alkaline with a little potass, a greenish precipitate, which is made white by the addition of a little hydrochloric acid. *Protosalts of iron* yield a greyish green precipitate, which becomes Prussian blue on adding some sulphuric acid — *Nitrate of silver* causes a white precipitate insoluble in nitric acid at ordinary temperatures.

The Class of NARCOTIC-ACRID Poisons includes those possessing a double action, the one local and irritating, the other consisting of an impression on the nervous system, which is sometimes indicated by narcotic, and at other times by violent tetanic, symptoms. They generally prove fatal by their action on the nervous system. The organs on which they act remotely are the brain, spinal cord, and sometimes the heart.

NAME.	SYMPTOMS.	ANTIDOTES.	
Nux Vomica — Upas Antiar — Cocculus Indicus — Woorara — Strychnia, &c., &c.	The action of these is on the spinal cord, causing convulsive stiffness, and spasm of the muscles of respiration—should the patient not die suddenly in a spasmodic fit, he may either recover, or die in a little time apparently from exhaustion, or from inflammation of the stomach and intestines.	The poison should be expelled from the stomach by the *stomach-pump*, or by a *brisk emetic.* — *Iodine* — chlorine have been found useful.	
Atropa Belladonna — Hemlock — Tobacco-Thorn-Apple — Fox-Glove — Rue — Darnel — Ergot of Rye, &c., &c.	Violent agitation —convulsive actions of the face and limbs—delirium—severe vomiting and purging—abdominal pains—great depression—sinking of the pulse and death.	A brisk emetic, and an active saline purgative. If there be much stupor, venesection—inflammatory symptoms to be treated in the usual way by leeches, fomentations, and bland drinks.	

RULES TO BE OBSERVED IN PRESCRIBING.*

"Medicus, vir prudens, prescribat nihil, nisi cujus sufficientem queat reddere rationem, cum requiritur: hinc nunquam tumultuario, sed semper ex indicatione prius rite deducta, agat."

GAUBIUS.

The preliminary knowledge necessary to the person who would prescribe judiciously and elegantly, is much more varied and complex than is generally supposed. Besides a knowledge of general therapeutics, or of the general principles of medical treatment, to which knowledge, by the way, an intimate acquaintance with physiology and pathology is indispensable, as we have already stated in the commencement of this work, there is also required a thorough acquaintance with the materia medica, including a knowledge of the different physiological effects and therapeutical uses of the various medicines employed—as also as with chemistry and pharmacy, and with the various operations resorted to in the latter, in the preparation of medicines, both simple and compound; qui enim, (says Gaubius) pharmacopœo dabit leges, ignarus ipse agendorum? Quomodo delectus fieri cum ratione potest rerum ignotarum? Taking it for granted, however, that a competent knowledge of these preliminary branches of medical science has been already attained, we shall confine ourselves at present to pointing out the leading objects which the young practitioner should always keep in view in the composition of an extemporaneous formula, so that he may render it as effectual, and at the same as elegant, or at least as little disagreeable, as possible.

Before we enter on the immediate subject of extemporaneous prescription, we shall lay down some general rules and directions to be observed by the practitioner previous to writing his formula.

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* The substance of these rules has been compiled from Gaubius' work *De arte concinnandi formulas*; from Dr. Paris' Pharmacologia, and from Edwards' and Vavasseur's work on Materia Medica.

1. He never should prescribe any medicine, for which he cannot assign a sufficient reason; neither should he proceed rashly or hurriedly, but conformably with the indications carefully deduced from the phenomena of the disease. If the disease be still doubtful, or if it be supposed that nature alone is able to overcome it, or if it be incurable, he must be very cautious in interfering, lest he may injure the patient, or weaken him unnecessarily. As it is, however, in many cases distressing to the patient to be entirely abandoned and given up by his medical attendant, it is sometimes advisable to consult his feelings, and to prescribe something, which, though it may be of no use in curing the disease, yet may do no harm.

When a mild medicine will suffice, we should not give one that is too active; this rule is chiefly to be observed when the patient happens to be weak, or very nervous. The practitioner should sedulously avoid, as much as possible, medicines of a disagreeable, nauseating, or exhausting nature. The observance of this rule is chiefly necessary in the case of delicate women and children.

If their virtues are the same, natural are to be preferred to prepared, and simple to compound medicines. It was Pinel who said that the employment of simple remedies, so conformable to sound doctrine, has at least the merit of producing the most direct effects, and of not complicating the history of the disease.

The prescriber should be acquainted with the consistence of medicines, both simple and compound, and with their different solubility in water, alcohol, ether, oils, &c., for fear of prescribing them in an improper form.

He should also pay particular attention to the chemical actions which may take place between the different ingredients of a formula; not that all formulæ are to be rejected or condemned in which such actions occur, as two substances are frequently prescribed, which it is known will mutually decompose each other; care, however, must be taken that such actions may not change the transparency, colour, smell, or the medicinal properties of the remedies, and that without the prescriber's knowledge.

The practitioner should also be acquainted with the ingredients of the several officinal preparations, so that he may not direct extemporaneously a medicine already prepared in the shops, or may not add to a compound ingredients already employed in it.

If the remedies indicated may be given in different forms, he should consult the patient's taste as to the form he likes best; as, for instance, it would be no use to prescribe pills or a bolus to one who could not swallow. However, all medicines will not admit of being given in every form indiscriminately; sudorifics are in general best given in the liquid form, absorbents in the dry form; whilst fœtid medicines are best given in pills.

If the medicine prescribed agrees with the patient, its use should be continued, until the indication requires another; for changes should not be made in this matter without reason. Jos. Frank says that to change at noon the medicines prescribed in the morning, and to reject in the evening those prescribed at noon, plainly bespeaks either great ignorance, or at least great fickleness on the part of the practitioner. Sometimes, however, it is expedient to vary the form of a medicine, so as to prescribe an equivalent remedy, more especially in chronic diseases, in order to avoid disgusting the patient by too long a use of the same medicine, as well as to prevent its becoming inert by the force of habit.

It sometimes happens that the most skilful physician is he who prescribes nothing.

Medicines are either *simple* or *compound.* All the simples and some of the compounds being officinal, and their mode of preparation being fully described in our works on the materia medica and in our Pharmacopœias, we shall confine ourselves in this place to the consideration of such complex formulæ as may become the subject of extemporaneous prescription.

When the physician prescribes a number of ingredients to be mixed together under one formula, he does so in order to attain various ends : 1st, To increase the action of the base or principal remedy ; 2nd, to diminish the too irritating action of a medicinal substance, and to avoid certain effects which would prevent it from fulfilling the indications he has in view ; 3rd, to obtain, simultaneously, the effects of two or more different remedies ; 4th, to compound a new remedy, the effects of which cannot be produced by any of the substances taken separately ; 5th, and lastly, to facilitate the administration of medicinal substances.

To increase the action of the base, or principal remedy.—This may be done first by combining several preparations of the same medicine. This expedient is resorted to when all the active principles of a remedy are not soluble in the same liquid, and the remedy itself cannot be conveniently exhibited in substance. Thus where it may be necessary to administer bark, and the stomach of the patient will not bear the exhibition of it in powder, the physician may combine in the one formula the decoction and tincture of this substance ; for nearly the same reason, when an infusion or decoction of a vegetable substance is prescribed, its tincture is usually added—the tincture of senna is generally directed to be added when the infusion is ordered. (A)

2d. By combining medicines of the same kind, that is, which are capable of producing, separately, the same effect, but with less energy than when united. We have daily instances of the adoption of this principle in the ordinary prescriptions for purgatives, stimulants, narcotics, and antispasmodics. Thus' in prescribing purgatives, calomel, rhubarb, and jalap, are often combined; the common purgative mixture, consisting of infusion of senna, tincture of senna, and sulphate of magnesia, affords another instance of it. The compound extract of colocynth is another instance of the adoption of the same principle. In prescribing stimulants, nothing is more usual than combining several different substances; thus æther, tincture of cardamums, oil of carraways, &c., are frequently combined under the one formula—the fetid gums, ammoniacum, galbanum, &c., are combined with advantage in hysterical cases. In prescribing emetics, ipecacuanha and tartar emetic are frequently conjoined in the same formula.

3. By uniting the remedy with a substance of a different nature, which has no action upon it; but which renders the system in general, or the stomach, or any other organ in particular, more susceptible to its impression. It is found that in the simultaneous exercise of the tonic and purgative principle, the former increases considerably the power of the latter. Dr. Cullen has observed, that by infusing senna leaves with a bitter substance, we obtain from the employment of a small dose of this purgative the same effects, as when it is used alone in a larger quantity. This probably is one (though not the only one) of the good effects of combining opium with mercury, in order to insure the general effects of the latter medicine. For the same reason stimulants are frequently added to purgatives for the purpose of accelerating the action on the bowels.

To diminish the too irritating action of a medicinal substance, and to avoid certain effects which would prevent it from fulfilling the necessary indications.

This may be done, 1st, by mixing it with a substance which augments or diminishes its solubility. It is in this way that the addition of a small quantity of an alkali diminishes the tendency which several drastic purgatives have of producing colics, and that, by mixing gamboge with an insoluble substance, we prevent it from producing nausea, as it is disposed to do, by its ready solution in the stomach, such admixture rendering its solution more difficult. 2dly, It may be done by mixing it with a substance capable of guarding the stomach, or system, from its deleterious effects. We have already seen that there are many substances which, when they irritate too violently the intestinal canal, cannot be taken up by absorption. For example, squill and antimonials no longer act as diuretics or diaphoretics, when they occasion vomiting or purging. Hence the necessity of combining them with substances capable of obviating this local action, and of correcting these effects. For the same reason opium is added to mercurials, and to preparations of iodine, to prevent them from exciting the intestinal mucous membrane, and passing off by the bowels. Bitter, saline, and other nauseous drugs will often stay on even delicate stomachs, by the addition of a small portion of an aromatic powder or tincture. The addition of spices, and in some instances of a narcotic, is also a very effectual means of obviating griping and flatulence. The occasional unpleasant effects of opium may be diminished by the addition of a vegetable acid, or an aromatic.

3. *To obtain, simultaneously, the effects of two or more different remedies.* This is done where the physician has several distinct indications to fulfil. Thus tonics are sometimes combined with purgatives, when it is necessary to produce free purgation, and at the same time to sustain the tone of the system in general, as well as of the stomach and bowels in particular; tonics are frequently combined with anthelmintics, where the indications are to expel the worm, and so to strengthen and invigorate the digestive organs, as to prevent their

reproduction; antispasmodics are combined with expectorants in asthma, in order at the same time to relax spasm and to procure free secretion; stimulants and tonics are added to diuretics, as well as to purgatives, in cases of dropsy complicated with great debility. Opiates are added to aperients in order to relieve pain or induce sleep, at the same time that we wish to procure a free state of the bowels; the same combination is found useful in the treatment of colic, the opium first relaxing the spasm, whilst the purgative is thus enabled to evacuate the intestines: alkalis are combined with vegetable astringents, bitters, and anodynes, where the lithic diathesis is complicated with irritation of the vesical mucous membrane and feeble powers of digestion. It is in cases of this description where several indications present, or seem to present themselves, that the prescriber runs a great risk of committing errors by attempting to produce, by his combinations, effects which are physiologically incompatible. Nor will this risk be completely removed until we have attained a more perfect knowledge of the physiological actions of our remedies. As an instance of this, we may adduce the combination of calomel, digitalis, and squill, so commonly resorted to in the treatment of dropsy. Theory would lead us to conclude that these ingredients are incompatible with each other, the action of squill being stimulant, whilst digitalis depresses the action of the heart. To avoid the absurdity of attempting to reconcile inconsistent indications, and of endeavouring to combat several merely functional derangements, the practitioner should direct all his energies so as to establish a correct diagnosis, and thus trace up the varying and diversified symptoms to their real source, as it is by these means only that any rational indication can be attained, and consequently the only sound line of treatment be deduced. Rostan truly says, "Medicine consists entirely in the science of indications, the first and most important of which is the knowledge of the seat and nature of the disease to be treated."

To compound a new remedy, the effects of which cannot be produced by any of the substances taken separately.

This may be accomplished, 1st, by uniting remedies, the action of which is essentially different, and which by their union produce on the economy effects different from those they would induce, exhibited singly, without, however, acting chemically on each other. We have a striking instance of this principle in the combination of opium and ipecacuanha; we neither have the narcotic effects of the opium, nor the emetic action of the ipecacuanha; but they both, when combined, act as a powerful diaphoretic. 2nd, By combining substances which act chemically on each other, producing in this manner new compounds, or which bring into full operation the active principles of one of them. Thus, by combining acetic acid with ammonia, we obtain a new product, the action of which is very different from that of either of these bodies taken singly. 3rd, By mixing substances, by which the solubility of the principles in which their remedial properties reside, is increased or diminished. Thus it is found that bitartrate of potash is rendered more soluble, and consequently more active, by the addition of boracic acid.

To facilitate the administration of medicinal substances, by imparting to them a more convenient, efficacious, and agreeable form.

Thus, in selecting a vehicle, the practitioner should choose one which may correspond with the nature and mode of action of the principal or active ingredient. The taste of the patient also should be consulted, with respect to the *form* in which a medicine may be given.

Conformably with the views now presented, a compound formula is generally made to consist of four distinct parts: viz. 1st, the *base* or principal medicine; 2nd, *the adjuvans*, or that ingredient which assists and promotes the action of the *base;* this was also so selected on many occasions, as to perform the part of a *dirigens*, and to determine the organ to which the energies of the base were to be directed; thus the action of nitre may be directed to the kidneys, or to the skin, according as we combine it with squill, on the one hand, or with ipecacuanha or guaiacum on the other; 3rd, the *corrigens*, or that ingredient which is intended to obviate any disagreeable or injurious effects arising from the other elements of the prescription; and 4thly, the *constituens*, or that ingredient which determines the form which the compound is to assume. This latter element is sometimes called the *excipient* or *vehicle.*

We are not, however, to infer that every extemporaneous compound formula should necessarily consist of four distinct ingredients, inasmuch as one of the elements so added may be capable of performing three of the functions above mentioned; thus, soap being added to purgative extracts, promotes their action and therefore acts as an *adjuvans*, mitigates their acrimony, and accordingly serves as a *corrigens*, and imparts a proper consistence for the formation of pills, and thus acts as a *constituens.* In the same way, if an aperient powder be given in syrup of ginger, its action on the bowels is promoted, at the same time that its griping properties are corrected, and an agreeable form is imparted to it. The addition of neutral salts to resinous purgatives will both quicken their action and correct the griping which so often attends their operation.

The division now given of the constituents of a compound extemporaneous formula, may serve to point out the order in which the several ingredients should be placed when writing the prescription. Sometimes, however, the chemical or mechanical properties of some of the substances will render it necessary for the physician to adopt a somewhat different arrangement, in order that he may guide the apothecary in the most judicious mode of compounding and preparing the required medium; thus, where volatile substances are introduced into a formula, they should be added last, lest they may be injured during the process of preparation. For the same reason, if it be necessary to combine a substance, whose virtues are obtained only by infusion or decoction with another whose medicinal powers depend on an essential oil, the latter substance should not be added till the former has undergone the necessary infusion, or coction.

With respect to the particular *forms* in which medicines are best exhibited, and the general principles necessary to be observed in their preparation, we shall now make a few remarks.

Medicines may be administered in the *solid* or *liquid* form.

SOLID FORMS.

Powders.—The form of powder is the most eligible in the employment of insoluble substances, which do not undergo, in transitu, those alterations necessary to the production of their good effects—in administering substances all the active principles of which are not soluble in the same menstruum, &c.; or when a medicinal substance is capable of producing mechanical irritation of the stomach in its integral form. The degree to which the comminution of the substance should be carried, in order to obtain its fullest effects, is by no means a matter of indifference. Generally speaking, an extreme degree of pulverization promotes the action of those substances whose active principles are not soluble; whilst it impairs or entirely destroys the activity of those whose active principles are of a volatile nature, or contain extractive matter readily oxidized. Powders are either simple or compound. In order to facilitate pulverization, the substance to be pulverized is frequently triturated with other substances, which, though inert in themselves, are useful by their more completely dividing and comminuting the more active constituents. It is with this view the sulphate of potass is used in the preparation of Dover's powder. The prescriber would do well to hold in recollection that there are some salts, which in the dry state become moist and even liquid by being rubbed up together, and thus undergo decomposition. This change is effected either by the water of crystallization, or from the absorption of the aqueous vapour existing in the atmosphere. In selecting a vehicle for the exhibition of powders, water, or some other convenient fluid, syrup, or mucilage, confection, honey, or sugar, may be employed, according to the taste of the patient ; but where heavy and insoluble powders are administered, a thick and viscid vehicle should be selected, to prevent their subsiding to the bottom. Where insoluble powders, much lighter or heavier than the fluid in which they are administered, are ordered, the prescriber should direct that the bottle should be well shaken before each dose, for obvious reasons. Where a patient has continued the use of insoluble powders for a length of time, an occasional aperient will be found necessary to prevent their accumulation in the intestines. From the neglect of this precaution, dangerous concretions have formed in the colon from the protracted use of magnesia. The dose of a powder should not exceed one drachm.

Pills.—These are small round masses, generally weighing from one to five or six grains, and of a consistence sufficient to preserve them in the globular form. This form is best suited for the exhibition of substances which have an unpleasant smell or taste ; which are capable of acting in very small doses, as metallic salts, &c. ; which are intended to act slowly and gradually ; or those which are intended not to act till they have reached the large intestine; and lastly, for the administration of substances whose specific gravity is too great to allow of their suspension in an aqueous vehicle. The disagreeable smell or taste may be further concealed, as also the quick action of the pill may be retarded, by involving it in some inert powder, or in gold or silver leaf. Substances which should not be administered in the pillular form, are those which will not operate except in large doses; those which attract moisture from the atmosphere; those which require a great quantity of dry powder to bring them to a proper consistence; and lastly, those which, from their very great insolubility when given in the solid form, are liable to pass through the intestinal canal without undergoing any solution, and consequently without exerting any action. When the mass is not of a proper consistence for pills, mucilage, confections, or extracts may be added; too great softness in the mass may be readily corrected by the addition of powdered liquorice-root, or magnesia; treacle is often found a useful adjunct for imparting a due consistence to a pill mass, and it has this recommendation, that pills made with it are not liable to become hard.

The addition of a small quantity of an essential oil, or of some aromatic powder to the pill mass, is often useful to facilitate and expedite its action on the intestines.

Boluses differ from pills merely by their larger size and less consistence. They generally consist of powders made up into a soft paste with electuary of senna, conserve of roses, aromatic confection, or the like. They constitute one dose.

Electuaries are extemporaneous compounds, formed by mixing medicinal substances in the state of powders, and incorporating them by means of pulps, syrup, or honey. Molasses or treacle is sometimes employed to form these preparations. The quantity of syrup necessary depends on the nature of the substances to be combined. Thus, dry vegetable powders require twice their weight of syrup or honey, whilst gummy and resinous powders require an equal weight. In combining hard mineral substances into the form of an electuary, it is necessary to use some conserve. The whole quantity constituting the electuary ranges from two to four ounces.

Suppositories are solid remedies of a conical form, which are introduced into the rectum, and allowed to remain there for a certain time to act either as emollients or purgatives. They are generally made of ointments, or of a piece of soap formed into a proper shape.

Liquid Form.

Mixtures.—These are the result of the union of several liquids, such as infusions, decoctions, tinctures, &c., in which solid substances are also sometimes diffused by means of mucilage or syrup. When insoluble powders are introduced into mixtures, they should be mechanically miscible in the liquid, and should not be too heavy, nor should they be of a nature to render the mixture too thick. In the selection of a menstruum, we should do well to consider whether it is calculated to co-operate with the chief ingredients in the formula, and to correct any unpleasant effects which they may be likely to produce; thus, if the active ingredient is likely to nauseate, or to gripe, camphor mixture, or some aromatic water, will be the fittest vehicle.

Draughts.—These differ from mixtures only in quantity; they constitute but a simple dose, which should never exceed f℥j—℥iij. Whenever the ingredients of a mixture are liable to spontaneous decomposition, or to deterioration, by the action of the atmosphere, the form of draught is to be preferred.

Emulsions are extemporaneous preparations, of a white or a milky appearance, consisting of a certain quantity of fixed oil kept in suspension in water, by means of albumen, sugar, &c. Oily seeds, more especially those of sweet almonds, are generally employed for their preparation. The suspension in water of a fixed or volatile oil, of a resin, of a gum-resin, or of a balsam, with the assistance of any intermediary, constitutes also a kind of emulsion. These preparations should never be mixed either with acids or alcohol, as coagulation would be the result.

With respect to the other forms in which medicines are administered, I beg leave to refer to the excellent dispensatory of Dr. A. T. Thomson.

We shall now call attention to the errors which are most likely to occur in extemporaneous prescription. These may be referred to the following heads:

1. *Substances are directed to be combined, which are incapable of mixing, or a peculiar form for a medicine is prescribed which its ingredients, when added together, cannot assume or preserve;* as ordinary oils, balsams, or resinous substances in infusion, decoction, &c., without the necessary intervention of some bond of union, such as mucilage, yolk of egg, an alkali, &c. An error of a similar kind would be ordering calomel in an aqueous vehicle. Substances have been ordered to be administered in the form of powder, which when triturated become liquid; directing the pillular form for a compound, the ingredients of which have too little cohesion to preserve such a form.

2. *Directing substances to be combined, which react on each other and produce mutual decomposition, thereby giving rise to new compounds which possess properties entirely different from those contemplated by the prescriber.*—Such an error would be committed by directing the diacetate of lead with alum, or with the acidulated infusion of roses, or with sulphate of mag-

nesia. We must not, however, reject a remedy the value of which has been established by experience, merely because it happens to be at variance with chemical theory. Here it is that a knowledge of the chemical habitudes of medicinal substances must be brought into constant requisition. It may, however, be some help to the prescriber, in his endeavouring to avoid this error, to hold in remembrance the law established by Berthollet, viz., that "when two salts in solution are brought together which contain within them elements capable of producing a soluble and insoluble salt, a decomposition must take place." This law has been illustrated by the instance of nitrate of silver and muriate of potass, the ingredients of which are capable of forming a soluble salt, nitrate of potass, and an insoluble salt, muriate of silver.

3. *Directing the ingredients to be prepared according to a method that is inadequate to produce the end desired, or injurious to their medicinal efficacy.*—Thus, we should fall into this error if we were to direct a decoction of a plant whose medicinal virtues reside in an essential oil, which is volatilised, or in extractive matter which is soon oxidized, by such a mode of preparation. Equally erroneous would it be to order infusion, instead of decoction, in the preparation of a vegetable substance, whose mucilaginous or other qualities we would wish to obtain in the largest quantity, in solution. Again, we must beware of selecting an improper menstruum, such as an aqueous one for a vegetable whose resinous qualities we would wish to extract, or an alcoholic one for the solution of gum.

On the doses of Medicinal Substances.

In determining the dose of a medicinal substance, very many circumstances must be taken into consideration; the object we have in view—the age—sex—temperament—idiosyncrasy—habits of the patient—duration of the disease—state of the alimentary canal—climate—season, and the variable activity of the medicine.

With respect to the influence which the object we have in view should exercise over the dose of a medicine, we have to remark, that upon the amount of dose the species of action exercised by a medicine often depends; thus, small doses of camphor act as a gentle stimulant and diaphoretic, whilst large doses prove emetic. Opium in minute doses frequently repeated, especially in enfeebled states of the system, has generally an exciting effect, whereas in large doses it is narcotic. Minute doses of neutral salts are diuretic, moderate ones aperient, and large doses prove emetic. Antimonials in small doses act on the skin, and in large doses vomit and purge. Hence will appear the absurdity of the opinion, that the effects of a medicine increase in a direct ratio with the dose. From the circumstance that large doses of medicinal substances produce rather a local than a constitutional effect, and hence are liable to speedy expulsion from the stomach and bowels, it is evident that when we wish to secure the absorption of a medicine into the system, we should administer it in small doses.

With respect to the influence of *age* on the dose, it may be observed, that adults and persons in the vigour of life generally require the largest dose. Dr. Young's formula for apportioning the dose to the age is, that the doses of most medicines for children under twelve years of age must be diminished in the proportion of the age to the age increased by twelve; thus, for instance, at two years $\frac{2}{2+12} = \frac{1}{7}$; that is, a child at two years of age requres one-seventh of the dose necessary for an adult.

To this law, or indeed to any general law on such a subject, the exceptions are very many. We know that children bear calomel in proportionately larger doses than adults, whilst in the administration of narcotics to children the application of the above rule is wholly inapplicable.

Sex.—Women generally require smaller doses of medicine than men. *Temperament* must also be taken into account in ascertaining the dose. Phlegmatic and melancholic persons, and those whose muscular system is well developed, require larger doses than those of a nervous or sanguineous temperament. The physician should also make himself acquainted with the idiosyncrasy or individual peculiarities of his patients, if any there be. Gaubius states that the very smell of a purgative will move the bowels of some persons, whilst others will require double the ordinary dose. In the administration of blisters, mercurials, and opiates, the peculiarities of patients are always to be consulted and allowed for.

The *habits* of the patient must also be taken into account. Persons long addicted to habits of intemperance bear depleting measures very badly. In the case of drunkards, the withdrawal of his accustomed stimulant has been productive of alarming effects. Habit generally diminishes the effects of most medicines, especially of narcotics. Hence the necessity of gradually augmenting their dose, or of substituting one for another, if we wish to keep up their effect. To this law of habit, however, some exceptions present themselves. Thus, saline aperients, especially in a dilute form, appear rather to acquire additional power from repetition. The *duration of the disease* must be considered—thus, depleting measures are not tolerated in an advanced period of a disease, which at its commencement might be borne with impunity. We must also consult the state of the alimentary canal. Should this organ be in a state of irritation, it is well known that many medicinal substances no longer possess their usual effects. We have already shown, that under such circumstances digitalis no longer possesses its sedative or diuretic power, nor mercury its antisyphilitic powers. A preparatory treatment is therefore required. *Climate* must also be taken into account in apportioning the doses of medicines; thus, the enormous doses of calomel so frequently resorted to in warm countries in the treatment of hepatic and other inflammations, are seldom required here, whilst the large doses of purgatives usual in this climate would be productive of the greatest mischief in warm regions.

The prevailing diathesis of the season will also influence the doses of medicines. Thus, in autumn, when dysentery or cholera may be present, we must be moderate in our use of those substances which have a tendency to irritate the mucous membrane of the alimentary canal. The *variable activity of a medicine* must also be taken into account, especially in the case of medicines liable to deterioration from being long kept, such as powdered digitalis, &c. It would be prudent in the practitioner, whenever a fresh supply of an active medicine is commenced, to reduce the dose considerably, and then gradually to raise it.

The *time of the day* at which medicines should be administered, must also be considered. Thus, narcotics are best given at night, as are also purgatives, those especially whose action is not very rapid. Diaphoretics also are best administered at such a time that their action may take place at night, when their effect is promoted by the natural tendency in the skin at that time to relaxation; whilst, on the other hand, the time for the exhibition of diuretics should be so chosen, that their effects may occur in the daytime, as we can then more easily promote their action by a due regulation of the temperature of the body.

The *intervals between each dose* will depend on the nature of the remedy and the object to be fulfilled: when the practitioner intends that the subsequent dose should keep up the effects of the preceding one, the intervals should be short; thus, in the exhibition of emetics, diaphoretics, diffusible stimulants, &c., the intervals between the doses should be short.

Narcotics, on the contrary, should be administered in full doses and at very long intervals. The practitioner would do well to recollect, that there are some medicines which possess the property of accumulating in the system, as mercury, digitalis, &c. The repetition of small doses of the latter drug, at short intervals, till it produces a sensible effect, is considered an unsafe practice.

TABLE *of the quantities of the different forms of the medicinal substances usually prescribed, and of some of the ingredients commonly added to the active medicine.*

POWDERS should average from four grains to a drachm—powders of calomel and other active medicines are sometimes smaller.

PILLS.—From three to five grains—narcotic pills are sometimes smaller.

BOLUS.—From one scruple to a drachm.

ELECTUARY.—Each dose from half a drachm to two drachms.

DRAUGHT.—From one to three ounces.

TINCTURE.—Quantity added to an infusion, &c., in order to favour its action, averages from half a drachm to a drachm and a half to each fluid ounce. (From this rule the narcotic and sedative tinctures are to be excepted.)

SYRUP—Simple—half a drachm to a drachm and a half to each ounce of mixture or draught. In the case of compound syrups, containing active ingredients, from one to two drachms may be added.

GUM ARABIC IN POWDER.—Two drachms to suspend one ounce of oil—half a drachm to each ounce of fluid for cough mixture.

Mixtura Acaciæ.—One to two drachms to each ounce of fluid—six drachms to an ounce of fixed oil to form an emulsion with water; or to suspend one drachm and a half of balsam of copaiba with a little sugar in an eight-ounce mixture.

Soap.—One part to three of powders to form a pill mass—the same proportion of bitter extract or confection is required.

Powders.—From one scruple to a drachm to each fluid ounce of a mixture.

Aromatic Confection.—From half a scruple to one scruple to the fluid ounce.

Essential Oils.—♏$\frac{1}{6}$ to ♏$\frac{1}{2}$ to a pill; ♏ij—vi. to be dropped on sugar, and rubbed up with water for a draught.

With respect to the values of certain measures used in apportioning the doses of medicines, it may be observed that

A wine-glass (cyathus vinarius) is supposed to contain from 1½ to 2 oz.

A table-spoon (cochleare amplum) contains half an ounce.

A dessert-spoon contains about two drachms.

A tea-spoon contains about one drachm.

Measuring by the *minim*, or sixtieth part of a fluid drachm, is much more correct than the old method of measuring by *drops*, the size of which depends not only on the nature of the lip of the vessel from which the fluid is dropped, but also on the nature of the fluid itself.

FORMULÆ.

NARCOTICS.

1. ℞. Misturæ camphoræ ℥iss; tinct. opii ♏xxx; æther. sulph. ʒj.; syrup. croci ʒj. M. fiat haustus in promptu habendus, et urgenti febris paroxysmo sumendus. (This is a prompt and soothing draught in intermittent headache.)

2. ℞. Potassæ subcarb. ℈j; succi limon. ʒiv; aquæ menth. virid. ℥j; tinct. opii ♏xxv; syrup. tolut. ʒss. M. fiat haustus, horâ somni sumendus. (This is one of the best draughts for procuring sleep in the majority of diseases in which a narcotic may be required.)

3. ℞. Aq. ammon. acet. ʒiij; mist. acaciæ ℥j; syrup. limon. ʒij; tinct. opii ♏xxx. M. fiat haustus horâ decubitùs sumendus. (A useful sedative in catarrhal affections when the rest of the patient is much disturbed.)

4. ℞. Opii puri gr. ij; sap. duri Hispan. gr. iv. Simul contunde, ut fiat suppositorium.

5. ℞. Confect. opii ℈j; aq. menth. piperit. ℥i; syrup. zing. ʒi. M. fiat haustus. (In flatulence and atonic gout.)

6. ℞. Tinct. opii ♏xxv; spir. æther. sulphur. ♏xxx; syrupi tolut. ʒi; mist. camph. ℥j; M. fiat haustus.

7. ℞. Aq. ammon. acet. ʒiii; aq. cinnam. ʒj; tinct. opii ♏xxx; syrup. zingib. ʒij. M. fiat haustus. (A useful anodyne in many diseases attended with great restlessness and want of sleep.)

8. ℞. Opii pulv. gr. iv; antim. potassio-tartrat. gr. iij; theriacæ q. s. ut fiant pilulæ octo. Sumatur una bis quotidie (This is a good pill in rheumatism.)

9. ℞. Opii pulv. gr. ij. ; sapon. duri gr. iij. Fiat suppositorium. (This is a useful application to allay pain of the rectum, or to relieve uterine irritation.)

10. ℞. Tinct. opii ♏xl ; mucil. amyli ℥iv. M. fiat enema. (In dysentery.)

11. ℞. Aceti opii ♏xij ; mist. camphor. ℥i. M. fiat haustus h. s. sumendus. (Where a narcotic is indicated, this will answer the purpose extremely well, as it has neither a tendency to constipate the bowels, nor to derange the stomach or head.)

12. ℞. Tinct. opii♏ xx ; aquæ cinnam. ℥iss. M. fiat haustus h. s. sumendus.

13. ℞. Opii gr. ij ; pil. al. cum myrrhâ gr. xij. M. divide in pilulas quatuor ; sumantur duæ horâ somni. (The object of adding the aperient is for the purpose of obviating the constipating effects of the opium.)

14. ℞. Mist. camphor. ℥i ; tinct opii ♏xxx ; liq. antim. potassio-tartrat. ♏xxv. M. fiat haustus, horâ somni sumendus. (This will act both as a narcotic and a sedative.)

15. ℞. Mist. camphor. ℥i ; tinct. opii gutt. xxx. (A narcotic in violent nervous irritation.)

16. ℞. Mist. cretæ ℥vi ; conf. arom. ʒij ; tinct. opii ♏ xxx ; aq. cinnam. ℥ij. M. fiat mistura, unde sumantur cochlearia duo ampla post singulas sedas liquidas. (A useful mixture in protracted diarrhœa.)

17. ℞. Morphiæ acet. gr. j ; aq. destill. ℥i ; solve :—sumatur cochl. j. min. horâ somni ; vel, si dolor urgeat, sextis horis. (This has been found to be less stimulating, as well as less constipating than opium itself.)

18. ℞. Aq. destill. ℥i ; mist. acaciæ. syrup. simpl. aa ℥ss ; tinct. opii ♏i. M. (Of this mixture a tea-spoonful every half-hour may be given to an infant in the first month, till sleep is induced ; double that quantity in the second month.)

19. ℞. Mist. camphor. ℥i ; spir. æther. sulph. comp. ʒss ; tinct. opii ♏xij ; syrup. papav. ℥ij. M. fiat haustus horâ somni sumendus.

20. ℞. Opii puri granum ; extr. pap. somnif. gr. iv. M. fiat pillua secundis horis sumenda. (In traumatic tetanus.)

21. ℞. Opii puri gr. ij; confect. aromat. ʒss. M. fiat massa in pil. viij dividenda; capiat unam quartis horis. (In typhus)

22. ℞. Morphiæ hydrochlorat. gr v; extr. cicut. gr. iv; pil. hydrarg. gr x. M. fiant pilulæ xij; sumatur una quartis horis. (Wakefulness.)

23. ℞. Mucil. amyli ℥v; tinct. opii ʒss. M. fiat enema. (In peritonitis.)

24. ℞. Infus. ros. ℥iss; acid. sulph. arom. gtts x; liquor opii sedativi, (Battley's Sedative Solution,) gtts. xv; syrup. ros. ʒi. M. fiat haustus.

25. ℞. Pulv. antimon. gr. iij; subm. hydr. gr. ij; opii gr. j; mist. acaciæ q. s. Fiat pil. mane nocteque sumenda. (For relieving the pain in acute rheumatism.)

26. ℞. Morphiæ acetatis, gr. ½; extract hyoscyami gr. iij. M fiat pil. sextis horis repetenda. (May be employed as an anodyne, when the stomach is irritable, in enteritis, gastritis, &c.)

27. ℞. Aq. ammon acet. ʒiij; aq. cinnam. ℥i; tinct. opii ♏xxx; syrup. zingib. ʒij. *Fiat* haustus. (A useful anodyne when delirium arises infever from want of sleep.) Or the following:

28. ℞. Mistur. camphor. ℥j; vin. antim. ♏xx; syrup. papav. alb. ʒiij. Fiat haustus.

29. ℞. Morphiæ acetatis gr. ij; creosoti ♏xij; pulv. glycyrrh, et pulv. acaciæ āā q. s. ut fiat massa, quam divide in pil xij; capiat unam, omni horâ, urgenti dolore. (These pills are advantageously given in cases of anthrax and furuncle, with the intention of relieving pain.)

30. ℞. Infusi. rhæi ʒvj; magnes. calcin. ʒss; vin. colchici ♏xxx; tinct. opii ♏xxv; ol. caryophyl. ♏ij; sacchar. alb. ʒj. M. fiat haustus, sexta quaque horâ, sumendus. (For relieving pain and procuring rest in the paroxysms of acute gout.)

31. ℞. Camphoræ. gr. iij; pulv. ipecac. comp. gr. x; pulv. Jacobi ver. gr. ij; mist. acaciæ q. s. ut fiant pil. ij vel iij bis in die sumendæ. (For procuring rest in case of typhus fever.)

32. ℞. Argent. nitrat. gr. xij; opii pur. gr. vj; extract. conii macul. ʒij; extract. glycyrrh. ʒss; tere bene, et divide in pilulas ponderis granorum duorum; mane et vespere capiat iij. vel iv. (These pills have been recommended by Heim of Berlin, in epileptic diseases.)

33. ℞. Extract nucis vom. gr. vj ; pulv. ipec. gr. xij ; extract. humuli ʒi ; misce probe, et div. in pil. xxiv, quarum capiat binas, quarta vel sexta quâque horâ. Vel,

34. ℞. Strychninæ gr. ij ; pulv. ipecac. gr. xij ; conserv. rosæ ℈ij. Misce probe, et div. in pil. xxiv ; capiat ij quartis horis. (These pills are given with benefit in some cases of chronic dysentery.)

35. ℞. Pulv. antim. comp. gr. viij ; hydrarg. subm. gr. iv ; opii gr. i ; conserv. rosæ q. s. divide in pil. iv ; sumat unam sextis horis cum haustu salino effervescenti. (Aperient and anodyne in cases of fever with restlessness.)

36. ℞. Morphiæ acet. gr. i ; aquæ destill. ℥i ; solve ; sumat æger cochleare unum minimum horâ somni ; vel si dolor urgeat, sextis horis. (This is effectual in allaying pain and procuring sleep.)

37. ℞. Liquor opii sedativ. ♏xx ; ammon. carb. gr. vj ; mistur. camphoræ ℥iss. M. fiat haustus, sexta quâque horâ repetendus. (In a case of bad compound fracture attended with delirium.)

ANTISPASMODICS.

1. ℞. Radicis valerianæ, radicis serpentariæ, āā ʒij ; aquæ ferventis, ℥vij ; digere per horam, et liquorem frigefactum cola. colaturæ adde spirit. ammon. arom. ʒij ; tinct. serpentariæ ʒij ; M et divide in haustus sex ; sumat unum meridie et vespere. (This is an excellent antispasmodic in epileptic diseases. It relieves the irritable state of the nerves.)

2. ℞. Tinct. valerianæ ammon. ʒss ; spirit. æther. sulph. ʒss ; tinct. hyoscyami ♏xx ; mixturæ camphoræ ℥j. M. (This is an efficacious antispasmodic and anodyne draught in hysterical headaches.)

3. ℞. Bismuthi trisnitratis gr. v ; pulv. tragacanth. comp. gr. x. M. fiat pulvis, bis die sumendus. Vel,

4. ℞. Bismuthi trisnitratis ℈j ; extract. hyoscyami ℈j ; pulv. rhæi gr. x. Misce cum syrupo q. s. ; divide in pil. x ; sumat ter die. (These are excellent pills for allaying the irritability of the stomach in gastrodynia and chronic dyspepsia.)

5. ℞. Cret. prep. gr. xij ; aq. menth. pip. ℥ss ; aq. font. ℥j ; spirit piment. ʒij ; tinct. opii ♏xi. M. fiat haustus, ter die sumendus. (This is a useful carminative and anodyne for assuaging the pain and flatulence in the stomach, in some cases of dyspepsia.)

6. ℞ Sacchar. alb. ℥ss ; ol. anisi ♏xv ; aq. font. ℥iv ; spirit. carni ℥j ; tinct. lavand. comp. ʒj. M. fiat mistura cujus sumat cochl. iji, ter quaterve die. (For relieving cardialgia and flatulence in dyspeptic cases.)

7. ℞. Aq. anethi ℥iij ; spirit. cinnam. ℥j ; tinct. valer. ammon. ʒij ; tinct. opii ♏xx ; spirit. æther. sulph. ʒiss. M. capiat cochl. magna ij bis terve in die. (This is an excellent carminative in cardialgia and flatulence.)

8. ℞. Moschi gr. x ; camphoræ gr. v ; pulv. opii gr. ss ; conserv. ros. q. s., ut fiat bolus.

9. ℞. Castorei ℈j ; ammon. carbon. gr. v ; syr. q. s. ut fiat bolus. (Hysteria.)

10. ℞. Bismuthi tris-nitrat. gr. iv ; magnes. sacchari albi aa ℈ij ; divide in chart. iv ; sumat unam tertiis horis. (Dyspepsia.)

11. ℞. Bismuthi tris-nitrat. ʒij ; mist. acaciæ q. s., ut fiant pilulæ xxxvj ; sumat unam secundis horis. (Gastrodynia.)

12. ℞. Bismuthi tris-nitrat. ʒi ; castorei ʒss ; pulv. trag. comp. ʒij. M. divide in pulveres xij ; sumat unum ter die. (In neuralgic pain of stomach, and intestines—in pyrosis, &c.)

13. ℞. Mistur. camphor. ℥j ; pulv. valerian. gr. xv ; pulv. acaciæ ʒss. M. fiat haustus. (A useful antispasmodic in hysteria.)

14. ℞. Aq. menth. pip. ℥j ; pulv. rhæi gr. v ; pulv. valerian. gr. x ; ammon. sesquicarb. gr. iij ; tinct. zingiber. ♏xx. Fiat haustus, bis in die sumendus. (A good carminative and antispasmodic in hysteric cases attended with flatulence and other dyspeptic symptoms.)

15. ℞. Fol. belladonnæ exsiccat. gr. xij ; aq. calidæ ℥vi M. macera et cola. Sit pro enemate. (In spasms of the rectum or neck of the bladder.)

16. ℞. Pulv. valer. rad. ℈j ; pulv. cinnam. comp. gr. x. M. fiat pulvis, quartis horis sumendus. (In hysteria, nervous headache, &c.)

17. ℞. Misturæ moschi ʒxij; liquor. ammoniæ ♏xvj; tinct. castorei ʒj; syrup. papav. ʒss. M. fiat haustus, quarta quâque horâ sumendus. (Given in hysteria and convulsive affections, after the bowels have been effectually cleared.)

18. ℞. Olei anisi ♏x; magnesiæ ℈j; tinct. sennæ ʒij; aquæ menth. pip. ʒx. Fiat haustus, urgente flatulentia sumendus. (An efficacious remedy in spasm of the stomach arising from flatulence.)

19. ℞. Mistur. camphor. ʒj; spirit. ammon. fœtid. ʒj; syrup. croci ʒj. M. fiat haustus, urgente spasmo sumendus. (In hysteria.)

20. R. Infusi valerianæ ʒvj; tinct. valer. ammon. ʒj; mistur. camphoræ ʒiv. M. fiat haustus, ter die sumendus. (In hysteria.)

21. ℞. Mistur. camphor. ʒiv; tinct. castor. tinct. assafœt. āā ʒj; spt. ammon. aromat. ♏xx; pulv. acaciæ gr. viij. M. fiat haustus. (This is a powerful antispasmodic in hysteric diseases.

22. ℞. Aq. pulegii ℥iss; æther. sulph. ♏xxx.; tinct. opii. ♏xv. M. fiat haustus, quarta vel sexta quâque horâ sumendus. (May be given in asthma from preternatural irritability of the lungs.)

23. ℞. Aq. anethi ℥iss; æther. sulph. ♏xxx; tinct. opii ♏xx; tinct. lavand. comp. ♏xx. M. fiat haustus, quarta quâque horâ repetendus. (Antispasmodic in angina pectoris.)

24. ℞. Moschi gr. x.; aq. cinnam. ℥iss.; æther. sulph. ♏xx.; tinct. opii ♏xx. M. fiat haustus, ter in die sumendus. (A good antispasmodic when there are starting of the tendons and hiccup in typhus fever;) or the following:

25. ℞. Mistur. moschi—mistur. camphor. āā ℥iij.; æther. sulph. ℥ij. M. fiat mistura, de quâ capiat cochl. ij. magna tertia quâque horâ.

26. ℞. Infus. valerian ʒxj.; spir. ammon. fœtid. ʒss.; tinct. castor. ʒss. M. fiat haustus, bis terve in die capiendus. (In angina.)

27. ℞. Aq. anethi ℥ij.; tinct. castor. ℥ss.; æther. sulph. ℥j.; spirit. ammon. fœtid. ʒss.; tinct. opii ♏ xxx. M. fiat mistura, cujus sumat cochl. magna ij. tertia vel quarta horâ. (A good antispasmodic in cases of hysteric colic.)

28. ℞. Sodæ subcarb. ℈j; sodæ sulph. ʒss—ʒj; infus. sennæ, infus. calumbæ, aquæ pimentæ āā ʒiv.; tinct. card. comp. ʒi. M. fiat haustus. (May be given occasionally in cases of epilepsy.)

29. ℞. Aquæ ammon. subcarb. ℥i; tinct. succini ʒiij; tinct. castor. tinct. assafœd. āā ʒvj. M. capiat æger cochl. unum minimum vel duo, in aquæ cyatho. Vel:

30. ℞. Spirit. ammon. succinat. ʒiij; tinct. castorei, tinct. valer. ammon. āā ʒiiss; mist. camphor. ℥vij. M. capiat cochl. ji. vel iij. magna, adveniente paroxysmo. (Much recommended in epilepsy and other convulsive affections.)

31. ℞. Tinct. opii ♏vi; vini ipecac. ʒi.; aquæ puræ ℥i; syrup. simpl. ʒiij; sodæ carbonat. gr. xxiv. Sumat infans sextam partem quartis horis. (In convulsive cough.)

32. ℞. Tinct. digit. ♏x—xv; mist. camphor. ʒx; tinct. calumb. ʒj; fiat haustus, bis die sumend. (In palpitation of heart.)

33. ℞. Spirit. carui ℥ij; aq. font. ℥iv; æther. sulph. ʒi; tinct. opii ♏xxxx; tinct. lavand. comp. ʒi. M. capiat cochl. larga ij. ter quaterve in die. (A good carminative and stomachic in flatulencies, &c.)

34. ℞. Aq. cinnam. ℥iss; tinct. castor. ʒij; spirit. ammon. fœtid. ♏xx; æther. sulph. ♏xv. M. fiat haustus, quarta quâque horâ sumendus. (A powerful antispasmodic in hysteric affections.)

35. ℞. Aq. cinnam. ℥j; æther. sulph. ʒi; tinct. opii. ♏ xx; tinct. castor. ʒss; spirit carui ʒij. M. fiat haustus, ter quaterve die capiendus. A good carminative in cardialgic symptoms recurring in cases of hysteria.)

36. ℞. Moschi gr. x.; spirit. cinnam. ʒij; mistur. camphor. ℥iss; tinct. opii ♏xxx. M. fiat haustus tertia vel quarta quâque horâ sumendus. (Antispasmodic, useful in relieving fits of cramp, &c.)

37. ℞. Potassæ hydriodat. ʒss; axungiæ ℥iss. M. fiat unguentum. (One drachm to be rubbed over the tumor of bronchocele night and morning.)

38. ℞. Mist. assafœtid. ℥vi; tinct. valer. ammoniat. ʒiv. M. fiat mistura. Sumat cochlearia tria ampla quartis horis. (A useful medicine in nervous and spasmodic diseases.)

39. ℞. Assafœtid. ʒij; decoct. avenæ ℥x. M. fiat enema. (In flatulent colic.)

40. ℞. Camph. ʒi per guttas paucas spiritus rectificati in pulverem redactæ; vitel. ovi unius; decoct. hordei ℥xiv. M. fiat enema. (In the adynamic stage of fever.)

41. ℞. Olei tereb. ℥i; camph. rasæ ℈j; ol. olivæ ℥iss; vitelli ovi unius; spir. ammon. fœtid. ʒij; decoct. avenæ ℥ix. M. fiat enema. (This acts as a purgative and antispasmodic in flatulent colic, tympanitis, &c.)

42. ℞. Mist. moschi ℥vi; spir. ammon. arom. ʒij; tinct. castor. ʒiv; syrup. papav. ʒij. M. sumat cochlearia tria ampla quartis horis.

43. ℞. Camphoræ, confect. ros. āā ℈jj. Divide in bolos octo. Sumat unum quartis horis. (In typhus fever with subsultus, &c.)

44. ℞. Moschi ʒi; oxidi zinci ʒss; extr. valer. q. s. ut fiant pil. xxx. Sumat tres ter quotidie. (In epilepsy.)

45. ℞. Tinct. assafœtid. ʒij; tinct. castorei, tinct. moschi aa ʒi; tinct. opii ♏xxx; fiat mistura: sumat ♏xxx ex aq. menth. pip. ℥i secundis horis. (Hysteria.)

46. ℞. Assafœtid. ʒi; aq. menth. piperit. ℥vss; tere optime simul, et adde tinct. valer. ammoniat. ʒij; tinct. castor. ʒiij; æther. sulphuric. ʒj. M. fiat mistura: sumat cochleare unum amplum secundis horis. (In the hysterical paroxysm.)

47. ℞. Potass. nitrat. gr. x; aq. cinnam ℥j; liquor. ammon. acet. ʒiiss; spirit. æther. nitros. ʒss; syrup. limon. ʒss. M. fiat haustus, tertiis horis capiendus. (Given for the purpose of lowering the action of the heart and arteries of the brain in apoplectic cases.) In some cases it may be necessary to combine the refrigerants with antispasmodics, as follows:—

48. ℞. Mistur. camphor. ℥j; liquor. ammon. acet. ʒiiss; spirit. ammon. aromat. ♏xx; syrup. tolut ʒj. M. fiat haustus. Vel:

49. ℞. Infus. valerianæ, mistur. camphoræ, āā ʒv; sodæ subcarb. gr. x; spirit. æther. sulph. comp. ℥j. M. fiat haustus, bis terve in die sumendus.

50. ℞. Camphor. gr. iv; ammon. subcarb. gr. iij; pulv. ipecac. gr. j; extract. hyoscyami gr. iv; mist. acaciæ q. s. Fiant pil. iii. statim sumendæ cum haustu sequente, et horas post binas repetendæ, si sit opus.

51. ℞. Magnes. subcarb. ℈j; aq. anethi ʒx; spirit. æther. sulph. comp. ʒj; tinct. castorei ʒj; ol. anisi ♏ij. M. fiat haustus. (For relieving the patient in the paroxyms of asthma.)

52. ℞. Infus. valerian. ʒxi; spirit. ammon. fœtid. ʒss; tinct. castorei ʒss. M. fiat haustus, bis terve in die capiendus. Vel:

53. ℞. Infus. sennæ comp. ℥iss; tinct. sennæ ʒij; spirit. ammon. aromat. ʒss; tinct. card. comp. ʒj. M. fiat haustus statim sumendus, et rep. si sit occasio. (These draughts give relief in paroxysms of angina pectoris;) or the following:—

54. ℞. Mist. camphor. ℥i; liquor. ammon. acet. ʒij; spirit. æther. sulph. comp. ʒj; tinct. camphor. comp; syrup-papav. ʒj. M. fiat haustus.

SEDATIVES.

1. ℞. Mist. camphor. ℥j; liq. ammon. acetat. ʒij; spirit. æther. sulphur. comp. ʒj; tinct. camph. comp. ʒj; syrup. papav. ʒi. M. fiat haustus. (A draught to be taken for the purpose of obtaining relief in a paroxysm of angina pectoris.)

2. ℞. Ammon. carb. gr. x; aq. menth. sat. ℥iss; syrup. rosæ ʒj; tinct. opii ♏x. M. fiat haustus. (A good draught in acidity of the primæ viæ, attended with griping pain.)

3. ℞. Extr. conii ʒss; pulv. fol. conii gr. xv. M. divide in pil. xv, sumat unum ter dic. (This combination is found useful in allaying the pain of cancer, and in other painful affections, more especially when opium disagrees, or is apt to produce constipation.)

4. ℞. Extracti aconiti gr. i; extr. glycyr. gr. viij; bene conterantur. Divide in pilulas quatuor. Sumat unam mane

nocteque. (This has been found useful in chronic rheumatism, syphilitic nodes, and other painful affections. The dose may be gradually raised to half a grain at a time.)

5. Magnes. carbon. ℈j; tinct. card. comp. ♏xx; aq. anethi ℥ss. M. (One or two tea spoonfuls of the mixture may be given to very young infants once or twice a day, to remove colicky pains. The tincture should be omitted, if there be inflammation or irritation present.)

6. ℞. Acidi hydrocyan. dil. ♏ij; mist. amygd. ℥ij. M. fiat haustus. (A useful sedative in case of gastric irritability, in palpitations, angina, spasmodic or phthisical cough.)

7. ℞. Aquæ lauro-cerasi ♏xv; mist. amygd. ʒij. M. fiat haustus. (This is found useful in dyspepsia, nervous cough, &c. The dose may be gradually increased to one drachm.)

8. ℞. Pulv. digit. pulv. scillæ āā gr. xij; extr. hyoscyam. gr. xviij. M. divide in pilulas duodecim. Sumat unam ter die. (In asthma, and chronic bronchitis, complicated with disease of the heart.)

9. ℞. Decoct. polygalæ senegæ ℥vij; tinct. scillæ marit. ʒij; tinct. camph. comp. ʒvj; carbonat. ammoniæ gr. xv—℈j. M. capiat coch. ampl. j. secundis horis. (An excellent sedative in gastro-enteritis. It may be given after exciting some degree of ptyalism with calomel and Dover's powder.)

10. ℞. Mist. camphor. ℥i; vini antim. ʒi; aceti opii ♏ xv. M. fiat haustus. (To allay restlessness and determine to the surface in febrile disease, where the use of opium is not otherwise contra-indicated.)

11. ℞. Acidi hydrocyanici diluti ♏viij—xij; mist. amygd. ℥iv; syrup. tolut. ʒi. Sumat cochleare unum amplum tertiis horis. (The bottle should be well shaken before each dose. From its varying strength in different houses, it should be procured from the same place during its use.)

12. ℞. Mist. camph. ʒix; tinct. digit. ♏ v; acidi hydrocyan. dil. ♏ ij. M. fiat haustus, quartis horis sumendus.

13. ℞. Sodæ carbonat. gr. x; aquæ destill. ʒix; solve et dein adde acidi hydrocyan. diluti ♏ij; syrup. papav. ʒss. M. fiat haustus. (This has been found beneficial in relieving and shortening the paroxysm of hooping cough.)

14. Aquæ destill. ℥j; mist. acaciæ ℥ss; syrup. simpl. ℥ss; tinct. opii guttam. M. cochleare parvum quâque semihorâ. (This is the safest form for administering opium to an infant under a month old, when it is necessary to procure rest for it.)

15. ℞. Mist. acaciæ ℥ss; aquæ ℥i; aq. lauro-cerasi gtts. iv; syrup. aurant. ℥ss; tinct. opii guttam unam. M. (Use and dose the same as the above.)

16. ℞. Aquæ menth. piperit. ℥ij; magnes. carbonat. ℈ii; olei menth. guttam, olei anisi gtts. iij; tinct. castorei ʒss; tinct. card. comp. ʒss; tinct. assafœtidæ gtts. xv; spir. pulegii gtts. xv; tinct. opii gtts. v. (This is Dalby's celebrated carminative, employed to relieve the griping, acidity, flatulence and convulsions of children.)

17. ℞. Infus. menthæ ℥j; mist. acaciæ ℥ss; liq. potassæ gtts. vj; syrup. aurant. ℥ss; spir. lavand. c. ʒss; tinct. opii gtts. ij. M. ʒi—ʒij secundis horis. (This is used in the same cases as the former; when an anodyne effect is required, four drops of tincture of opium may be added.)

18. ℞. Liquor. ammon. acet. ʒvi; syrup. tolut. ʒvj; liquor. opii sedativ. ♏xij; vini antim. ʒi; aquæ ℥iss. M. sumat cochl. j. medium frequenter. (This is a useful demulcent and anodyne in the troublesome cough attendant on measles.) Or the following:—

℞. Liquor. ammon. acet. ʒv; syrup. papav. ʒiij; aquæ cinnam. mistur. camphor. aa ʒvj; aquæ ℥j. M. sumat cochl. j medium frequenter.

19. ℞. Aq. menth. pip. ʒvij; liquor. ammon. acet. ʒij; vin. colchici, ♏xv; syrup. mori ʒj. M. fiat haustus, ter in die sumendus. (This is a good sudorific and anodyne for relieving pain and irritation in cases of chronic rheumatism.)

20. ℞. Camphoræ, (ope spirit. vini rect. in pulv. red.) ʒss; extracti hyoscyami, gr. xv; extracti opii gr. iij. M et div. in pil. xij. æquales. (These are good anodyne pills in periodic cases of epilepsy connected with dysmenorrhœa. Two of them may be taken on the first accession of pain, and be repeated according to circumstances.)

21. Pil. hydrarg. gr. j; extract hyoscyami gr. ij. M. fiat pilula, omni nocte sumenda. (This pill is of use to regulate the bowels in chronic diseases of the mucous membrane.)

22. ℞. Plumbi binacet. pulv. digital. aa gr. x; opii gr. iij; mist. acaciæ q. s. Misce optime, et divide in pil. decem æquales, quarum sumat unam sexta quâque horâ. (These are powerfully sedative and astringent in active hæmorrhages.)

23. ℞. Infus. rosæ ℥iss; tinct. digital. ♏ xx; tinct. opii ♏x. Fiat haustus, sextis horis sumendus. (This is given with benefit in hemoptysis. &c., with the intention of lowering the circulation.)

24. ℞. Creosoti ♏j—♏ij; mucilag. ʒi; aq. ℥ix. (In irritability of stomach and alimentary canal.)

25. ℞. Creosoti gtts. iij; mist. acaciæ ʒiij; aq. destill. ℥iij. M. sumat ʒij ter in die. (In gastro-enteritic irritation.)

26. ℞. Infus. menth. virid. ℥v; tinct. opii ʒss; aq. laur. cerasi ʒij; spir. ammon. aromat. ʒj; syrup. aurant. ʒv. M. sumat ʒi; tertiis horis. (To relieve hysteric vomiting.)

27. ℞. Pulv. ipecac. comp. gr. iij; pulv. aromat. gr. vj; conserv. rosæ q. s. M. fiat bolus quartis horis sumendus. (A useful sedative and diaphoretic in dysentery proceeding from obstructed perspiration.)

28. ℞. Extract. conii ʒss; pulv. scillæ gr. x; pulv. ipec. gr. v. M. div. in pil. decem. Sumat j ter in die. (This is a good pill in chronic coughs.)

29. ℞. Extr. belladonnæ gr. iv; succi spissati sambuci nigri ʒss; divide in pilulas xvi. Sumat unam sextis horis. (In hooping-cough. The dose here given is that for an adult.)

30. ℞. Extr. belladonnæ gr. ij; aquæ destill. ℥i; fiat mistura sumat ♏ ij—v quotidie. (This has been proposed by Hahnemann, as a prophylactic against scarlet fever.)

31. ℞. Misturæ camphoræ ℥j; liquor. ammon. acet. ʒiiss; acidi. acetici pyrolignei ♏ xxv; syrup. zingiber. ʒss. M. fiat haustus, ter quaterve in die sumendus. (A useful sedative in nervous females threatened with abortion.)

32. ℞. Pulv. jacobi ver gr. iv; camphoræ gr. iij; pulv. ipecac. gr. ij; extract. hyoscyami gr. v; syrup. papav. q. s. M. fiant pil. iv; quarum capiat binas statim, et alteras post horam. (Sometimes given in asthma.)

33. ℞. Extract: opii. camphoræ āā ℈ij ; empl. galbani comp. ℥iiss. Fiat emplastrum, scuto pectori applicandum. (Has been sometimes found serviceable in relieving the paroxysms of asthma.)

34. ℞. Succi inspissati stramonii gr. j ; potass. subcarb. gr. vij ; ol. cajeputi q. s. M. fiant pil. ij ; pro dose sumendæ. (In asthma.)

35. ℞. Pulv. acaciæ ʒij ; mistur. amygdal. dulc. et camphoræ, āā ℥iv ; acidi hydrocyanici ♏ x ; spirit. æther. sulph. c. ʒij ; oxymel scillæ ℥ss. M. sumat cochl. ij vel iij larga ter in die. Vel :

36. ℞. Mistur. diosmæ crenatæ ℥v ; tinct. digital. ♏xxxv ; extract. conii gr. xxvj ; syrup. tolut. ℥ss. M. fiat mistura, cujus sumat cochl. larga ij ter quaterve in die. (In chronic bronchitis, particularly when combined with tubercle.)

37. ℞. Aq, ammon. acet. ʒiij ; aq. cinnam. ℥j ; tinct. opii ♏xxx ; vin. antimon. ♏xxxv ; syrup. papav. alb. ʒij. M. fiat haustus. (A powerful and highly efficacious anodyne in chronic rheumatism. It may be taken at bed-time, when the patient's rest is much disturbed by the severity of the pains.)

38. ℞. Extract conii gr. iij ; magnes. sulph. gr. x ; aquæ ʒv ; syrup. rhœados ʒj. M. fiat haustus, ter in die sumendus. (May be given as a sedative in some cases of hooping-cough.)

39. ℞. Tinct. scillæ ♏x ; acidi nitrici ♏vj ; extract. hyoscyami gr. iv ; aq. puræ, ʒx. M. fiat haustus, tertiis horis repetendus, (Expectorant and anodyne, when the tendency to secretion has increased in asthma.)

40. ℞. Veratriæ gr. iv ; alcohol. ♏ vj ; adipis ℥ss. M. optime. Fiat unguentum. (This is useful in painful chronic rheumatism, neuralgia, gouty and rheumatic paralysis—the quantity to be rubbed in is about the size of a small nut, night and morning. It causes heat and tingling in the part, which in a few days may extend over the entire body, sometimes accompanied by muscular twitchings of the mouth and eyelids. Majendie has applied the veratria endermically to the extent of a grain to a small blistered surface over the course of a nerve, in violent tic of the face, the application being renewed at a fresh point every fifth day.)

41. ℞. Aconitinæ gr. ij—iv ; alcohol ♏vi ; adipis ℥ss. M. optime. fiat unguentum. (Produces effects similar to the above.)

42. ℞. Liq. potassæ ʒij; acid. hydrocyan, dil. ʒj; mist. amygd. ℥viij. M. fiat lotio. (A useful application in prurigo.)

43. ℞. Mist. amygd. ℥vi; hydr. bichloridi gr. i. Fiat lotio. (In order to check the itching of lichen; a drachm of the dilute hydrocyanic acid may be added occasionally.)

44. ℞. Cocculi suberosi ʒi—ij; adipis ℥i. M. fiat unguentum. (This has been sometimes used in ring-worm.)

45. ℞. Potassæ cyanidi gr. xij; ol. amygd. ʒij; ung. ceræ albæ ℥ij. M. fiat unguentum. (In lichen and prurigo.)

46. ℞. Hydrarg. oxidi ʒj; cerati cetacei, ʒvj; pulv. opii ℈j. M. fiat unguent. (This is found useful as an application in some cases of piles.)

47. ℞. Infus. cuspariæ ʒx; acid boracici gr. x; vin. ipecac. ♏xx; tinct. camphor. comp. ʒj; syrup. papav. ʒiss. M. fiat haustus, ter in die sumendus. (May be given with benefit for restoring the strength in chronic dysentery.)

48. ℞. Plumbi acetatis ʒss; acidi hydrocyanici ʒiij; unguent. cetacei ℥iij. M. fiat unguentum partibus cutis nudis applicandum. (Much recommended as a sedative application for removing irritation in cases of eczema, &c.)

49. ℞. Acetat. morphiæ gr. j; pulv. ipecac. gr. x; syrup. limon.; aquæ destill. āā ℥ij. M. sumat. cochleare minimum. omni horâ. (To allay cough in phthisis.)

50. ℞. Balsam copaib. ʒi; mist. acaciæ, ℥iiiss; sacch. q. s. fiat emulsio; adde aquæ cinnamomi, mist. camphor. aa ℥ij. Sumat unciam ter in die. (A useful diuretic in dropsy, more especially when accompanied with bronchitis.)

STIMULANTS.

1. ℞. Carbon. ammon. ʒss; mist. camph. ℥vi; sumat. ℥i. secundis horis. (In the collapse occurring in febrile diseases.)

2. ℞. Ammon. sesquicarb. gr. iv; tinct. hyoscyami ʒj; liquor. ammon. acet. ʒiij; mistur. camphor. ℥j. M. fiat haustus, sextis horis sumendus. (Given in delirium tremens.)

3. ℞. Sp. ammon. succin. ♏xvi ; mist. camph. ℥iss. M. fiat haustus, bis terve in die sumend. (In chlorotic anasarca, or anasarca occurring after great loss of blood, as a gentle stimulant previous to the use of steel medicines.)

4. ℞. Aquæ carni ℥i ; mist. acaciæ ℥ss ; magnes. ustæ gr. xxiv ; olei cajeputi gtts. iv ; syrup. croci ℥ss ; spir. ammon. fœtid. ʒss. M. sumat ʒss—ʒij ter in dies. (This is found effectual in relieving griping, accompanied with great irritability of the stomach, flatulency, acidity, or diarrhœa in children. If a purgative effect be desired, a drachm of tincture of rhubarb may be added. If there be depression, half a drachm of compound tincture of lavender may be added.)

5. ℞. Aq. menth. pip. ℥j ; spirit. carui ℥ss ; tinct. lavand. comp. ʒij ; tinct. opii ♏xx. M. fiat haustus. (A good aromatic cordial in flatulent colic.)

6. ℞. Secal. cornut. ℥ss ; aq. bull. ℥xxiv ; syrup. simpl. ℥i. M. sumat uncias duas tertiis horis. (This has been found effectual in inducing premature labour, where such practice may be rendered necessary by deformed pelvis, or other circumstances.)

7. ℞. Ol. anisi ♏viij ; sodæ subcarb. gr. xv ; sacchar. alb. magnes. calcin. āā ℈j ; tene et adde tinct. castor. ʒj ; tinct. sennæ ʒij ; aquæ menth. virid. et mistur. camphor. āā ʒv ; syrup. tolut ʒss. M. fiat haustus, tertiis vel quartis horis ad tertiam aut quartam vicem sumendus. (For relieving flatulence in cases of chronic asthma.)

8. ℞. Mist. camphor. ℥iv ; ammon. carbon. ℈i ; tinct. cardam. comp. ʒij. Sumat unciam quartis horis. (A useful stimulant in typhoid forms of fever when the stage of collapse comes on.)

9. ℞. Misturæ camphoræ, ʒx ; ammon. sesquicarb. gr. v ; confect. aromat. gr. xv. M. fiat haustus, ter die sumendus. (A powerful stimulant, sometimes used in the low stages of fever.)

10. ℞. Assafœtidæ gum. resin. ʒj ; pulv. zingib. ʒss ; ammon. subcarb. ʒss ; syrup. q. s. ut fiant pil. xxx, quarum sumat tres tertiis horis. (A useful stimulant in paralytic affections.)

11. ℞. Terebinth. venet. ʒj ; vitel. ovi q. s. spirit. junip. comp. ʒj ; aq. font. ℥jv. M. fiat mistura, cujus sumat cochl. magna ij tertia quâque horâ. (This is a good stimulating sudorific in many cases of chronic rheumatism.)

12. ℞. Aquæ menth. ℥iss; spir. ammon. aromat. ʒss; spir. æther. nitros. gtts. xii; spir. lavandulæ comp. ʒj; syrup. caryophyll. ℥ss. M. sumat ʒj. Secundis horis. (This will be found a good stimulant, when restlessness, spasm, or convulsions are occasioned by exhaustion from over depletion, or from long protracted disease in children.)

13. ℞. Aq. anisi ℥j; mist. acaciæ ℥ss; olei terebinth. rectif. ʒss; olei limon. volat. gtts. iv; syrup. caryophyll. ʒiv. M. sumat ʒi—ʒij tertiis horis. (This is an excellent stimulant for children, in relieving the state of depression resulting from protracted diarrhœa, or any other cause—it may probably possess also anthelmintic powers.)

14. ℞. Camphoræ gr. iv. solve in spirit. vin. rect. ʒss, et adde aq. pur. ʒvj; aq. cinnam. ℥vj; ammon. carb. gr. x; syrup. cort. aurant. ʒj. M. fiat haustus, quarta quâque horâ sumendus. (This is often employed with much benefit in scarlatina.)

15. ℞. Ol. terebinth. pur. ʒj; mellis ʒij; spirit lavand. comp. ♏xx; pulv. acaciæ q. s. aquæ ℥j. M. fiat haustus, sextis horis repetendus. (This is sometimes prescribed as a highly-efficacious remedy in pulmonary hæmorrhage.)

16. ℞. Aq. destillat. ℥viij; aq. chlorinii (Ph. Dub.) ʒiss; syrup. limon. ʒij. M. sumatur per diem dosibus partitis. (The internal use of chlorine, according to such a formula as the present, has been recommended in scarlatina.)

17. ℞. Copaib. balsam. ʒiij; liquor. potass. carbon. ʒiss; decoct. hordei ℥viiss; copaibam cum liquore primum contere; dein adde gradatim decoct. hordei; sumat. ℥i—℥iss ter die.

18. ℞. Copaib. bals. magnes. aa ℥i. M. divide in pilulas cc.; sumat vi—xii ter die.

19. ℞. Piper. cubeb ℥i; sacchari albi ʒij; mist. acaciæ ℥ij; aquæ cinnam. ʒvi. M. fiat emulsio; capiat cochlearia duo magna ter die. (In gonorrhœa, gleet, &c.)

20. ℞. Spirit. æther. sulph. ʒj; tinct. opii, ♏ xxx; mist. camphor. ʒx; syrup. croci, ʒj. M. fiat haustus, incipiente frigore febrili sumendus. (The above draught is given in the cold stage of ague, as an internal stimulant, in conjunction with external warmth.)

21. ℞. Infus. cascarillæ, infus. rhæi āā ʒiij; ammon. sesquicarb. gr. iij; aq. flor. aurant. ʒj; tinct. aurant. ʒss; aquæ destillat. ʒiv. M. fiat haustus, ter in dies sumendus. (A good aromatic bitter and stimulant for restoring the tone of the stomach in chronic dyspepsia.)

22. ℞. Pil. hydrarg. subm. comp. ℈j; fellis tauri inspissati gr. xv; sapon. castil. gr. x; extract. taraxaci ʒj. M. fiant pilulæ xviij; quarum sumat binas vel tres horâ somni. (A good alterative in acne and other cutaneous affections where the functions of the liver are torpid.)

23. ℞. Mist. camphor. ʒx; spir. æther. sulph ʒj; conf. arom. ℈j; spir. lavand. comp. ʒss. M. fiat haustus quartis horis repetendus. (In attacks of sinking after fever, &c.)

24. ℞. Ammon. carb. gr. xv; aquæ destill. ℥j; spir. myrist. ʒi; syr. aurant. ʒss. M. fiat haustus cum succi lim. cochleari uno sumendus inter effervescendum.

25. ℞. Confect. arom. ʒss; opii gr. ij. M. divide in pilulas octo; sumat unam tertiis horis. (Here the opium given in small doses and at short intervals, acts as a stimulant.)

26. ℞. Creosoti ♏x; pulv. glycyrr. ʒj; mist. acaciæ q. s. M. divide in pil. xx; sumat duas ter die. (These pills are considered to exercise a tonic and stimulating effect in atonic rheumatism, and chronic bronchitis.)

27. ℞. Creosoti ♏j; mist. camph. ℥j; fiat haustus. (Useful to check vomiting, arising from causes unconnected with inflammation or organic diseases of the stomach; also, in seasickness.)

28. Mist. camph. ʒvj; tinct. guiac. ammon. ʒij; mist. acaciæ, syrupi āā ʒj. M. fiat haustus, ter in die sumendus. (In chronic rheumatism.)

29. Decoct. senegæ ℥viss; mist. acaciæ ʒiv; syrup. tolut. ℥. M. fiat mistura; sumat cochlearia tria ampla tertiis horis. (In catarrh attended with excessive secretion and great debility.)

30. ℞. Ol. tereb. ℥i; vitel. ovi unius; tere simul, et adde gradatim, mist. amygd. ℥iv; syrup. aurant. ℥ij; tinct. lav. comp. ʒiv; ol. cinnam. ♏iv. Fiat mistura; sumat cochlearia duo ampla ter in die. (In iritis, chronic rheumatism, &c.)

31. ℞. Potassæ fusæ ℈ij; aq. destillat ℥iv. M. fiat lotio. (This alkaline lotion has been found useful in the treatment of porrigo favosa, when the disease has become chronic.)

32. ℞. Potassæ carbonat. ʒi—ʒij; aquæ tepidæ lib. i. Fiat solutio. (This is applicable in the same cases as the above; it should be applied constantly to the part with moistened linen.)

33. Potassæ carbonat. ʒij; axungiæ ℥ij. M. fiat unguentum. (To be applied to the part affected after the above lotion; its use should be given up, if it prove too irritating.)

34. ℞. Axungiæ ℥iij; unguent. hydriodatis potassæ ʒiss. M. (An excellent ointment in the treatment of scabies.)

35. ℞. Liniment. camph. comp.; linim. ammon. fort. āā ℥i; tinct. capsici ʒiij. M. (A stimulating liniment to be rubbed over the chest and epigastrium in the slighter forms of angina pectoris in cases where depleting measures are not indicated.)

36. ℞. Antim. tart. ʒj; unguent. cetacei ʒvij; hydrarg. bisulph. gr. x. M. fiat unguentum. (This is a good external application to the throat in cases of aphonia from hoarseness, &c.)

37. ℞. Linimenti camphoræ comp;. linimenti ammon. fort. āā ℥j; tinct. capsic. ʒiij. M. fiat linimentum. (This liniment gives relief when well rubbed over the thorax and epigastrium in angina pectoris.)

38. ℞. Tinct. opii ℥j; spirit. camphor. ℥ss; aq. ammoniæ pur. ʒij. M. fiat linimentum. (This is a good stimulating and sedative embrocation in such cases as it may be required for.)

TONICS.

1. ℞. Infus. cascarillæ ℥j; ammon. sesquicarb. gr. v; tinct. card. comp. ʒi. M. fiat haustus ter die sumendus. (A good stimulating tonic.)

2. ℞. Mist. ferri comp. ʒviij; decoct. al. comp. ʒij. M. fiat haustus ter die sumendus. (A valuable tonic and gentle evacuant, the latter effect preventing the too stimulant action of the iron on the head; it is useful in cases of cerebral congestion, depending on debility or inanition.)

3. ℞. Pil. ferri comp. ℈j; pil. al. c; myrrh. gr. x. M. fiant pilulæ sex; sumantur duæ ter in die.

4. ℞. Ferri ammoniati ʒj; extr. aloes, ext. gentianæ āā ʒss; contunde simul et divide massam in pil. triginta, quarum sumat duas ter quotidie. (Given in dyspepsia, hysteria, scrofula, and mesenteric obstructions.)

5. ℞. Infus. quassiæ ℥iss; tinct. calumb. ʒiij; tinct. card. comp. ʒj. M. fiat haustus, ter die sumendus. (To strengthen the stomach in convalescence from cholera, dysentery, &c.)

6. ℞. Liquor. potass. ℥i; tinct. gent. comp. ℥j; hydriodat. potass. ʒss; iodinii puri gr. x. M. fiat solutio.—capiat cochleare j parvum bis in die ex pauxillo aquæ tostæ. (For promoting the absorption of glandular dwellings in the neck or other parts of the body.)

7. ℞. Quinæ disulph. gr. xxxvj; infus. ros. ℥xij; acidi sulphur. dilut. ♏xxxvi. M. sumat cochlearia duo ampla tertiis horis. (A useful remedy in profuse perspiration.)

8. ℞. Decoct. cinchonæ ℥vij; tinct. cinchon. comp. ʒvj; tinct. lavand. comp. ʒij; sumat cochlearia tria magna ter die.

9. ℞. Gum. sagapen; gum. galbani, sap. venet. āā ʒj; rhei ʒiss; antim. tartariz. gr. xv; succ. liquor. ʒi. Divide in pilul. gr. iij. (In amaurosis depending on disorder of the digestive organs. The pills to be continued for five or six weeks.)

10. ℞. Quinæ disulphat. gr. iij; sacchari albi gr. viij. M. fiat pulvis tertiis horis durante intermissione sumendus.

11. ℞. Quinæ disulph. gr. ij; infus. ros. comp. ʒx; syrup. aurant. ʒij. M. fiat haustus, quartis horis sumendus.

12. ℞. Quinæ disulph. gr. ij; acid. sulph. aromat. ♏xvi; aq. destill. ℥iss; syrup. caryophyll. ℥ss. M. sumat ʒi—ʒij. ter in dies. (A tonic for young children.)

13. ℞. Quinæ disulphat. gr. xvj; acid. sulphur. aromat. ♏xl; infus. aurant. comp. ℥vi; tinct. cinch. comp. syrup. zinzib. āā ℥i. M. fiat mistura; sumat unciam tertiis horis.

14. ℞. Quinæ disulph. gr. xij; acid. sulphur. dil. ♏vi; tinct. opii ♏vi; aquæ tepidæ ℥vi. M. fiat enema. (This method may be adopted, where the state of the stomach will not allow the medicine to be taken by the mouth.)

15. ℞. Ferri sesquioxidi ; pulv. rhei āā ʒi ; pulv. calumb. ℈iv ; pulv. zinzib. ℈ij. M. divide in pulveres xij ; sumat unum ter in die. (Where steel with other tonics are required, this is an effectual combination, as in chlorosis, tic douloureux, &c.)

16. ℞. Ferri potassio-tartrat. ℈ij ; syrup. tolut. q. s. Divide in bolos sex ; sumat unum ter in die. (A useful combination in the debility of the digestive organs which so often accompanies scrofulous disease.)

17. ℞. Ferri ammonio-chlorid. ʒi ; extr. al. extr. gentian. āā ℥ss ; contunde simul. Divide in pil. xxx ; sumat duas ter in die. (These pills are tonic and aperient, and found beneficial in anæmia, chlorosis, and the different forms of scrofula.)

18. ℞. Ferri cyanidi (ferri prussiat.) gr. iij ; syr. simp. ℥i. M. fiat haustus, ter die sumendus. (This is an American combination, and has been found effectual in intermittents and scrofula, and in some of the neuroses.)

19. ℞. Decoct. cinchon. ℥iss ; tinct. cinchon. comp. ʒiij ; acid. muriatic. gts. xv. Fiat haustus, tertia quâque horâ sumendus. (A tonic in putrid diseases.)

20. ℞. Decoct. cinchon. cord. ; infus. rosæ comp. āā ʒiv ; pulv. myrrh. gr. iv ; tinct. opii ♏iij. M. fiat haustus, ter in die repetendus. (To support the tone of the bowels, and promote a healthier action in dysentery, &c.) Or the following may be substituted :

℞. Infus. calumbæ ʒvj ; aq. cinnam. ʒiv ; syrup. papav. ʒi. M. fiat haustus, bis in die sumendus.

21. ℞. Infusi cascaril, ʒvj ; aquæ cinnam. ʒiij ; pulv. kino comp. gr. x ; syrup. papav. ʒj. M. fiat haustus, bis in die sumendus. (This is an excellent corroborant in irritability of the bowels in chronic dysentery.)

22. ℞. Infus. gentian. comp. ℥iss ; tinct. card. comp. ʒij ; æther., sulph. ʒss ; tinct. opii ♏xij. M. fiat haustus, ter die sumendus. (This is a good remedy for relieving the pains of the head and stomach, so common in dyspeptics and hypochondriacs.)

23. ℞. Extracti taraxaci, ℈ij ; extracti gentianæ, gr. x ; olei cinnam. min. ij. M. et divide in pilulas xij æquales ; sumat tres ter quotidie superbib. haustum decocti taraxaci. (Good tonic pills in epilepsy, combined with icterus or biliary congestion.)

24. ℞. Sulph. ferri gr. iij; sulph. quininæ, gr. j; infusi calumbæ, ℥j; acid. sulph. dilut. gts. iij. M. (This is a good tonic draught in epilepsy.)

25. ℞. Tinct. calumbæ ℥j; tinct. ferri sesquichloridi ℥ss. M. sumat. ♏xx. ter in die ex infuso zingiberis. (Sometimes recommended as a tonic in ricketty and other delicate subjects.)

26. ℞. Ferri. carb. gr. vij; calumbæ pulv. gr. iij; pulv. cinnam. comp. gr. ij. M. fiat pulvis, bis in die sumendus. (This is a good tonic in cases of rickets.)

27. Argent. nitr. gr. ij; (in aquæ ♏ij. solut.) micæ panis aliquantulum; conterantur optime in massam; tunc divide in pilulas xvj; sumat unam ter die. (In epilepsy, angina pectoris, and other neuralgic affections. The use of this remedy requires great caution. In order to avoid gastric irritation, or discoloration of the skin, the employment of it should be occasionally interrupted.)

28. ℞. Argent. nitr. gr. ij; extr. humuli ℈j; extr. hyoscyam. gr. xij; conterantur optime. Divide in pilulas octo; sumat unam ter die. (In dyspeptic palpitation and pyrosis. In the latter case one-eighth of a grain of opium may be added to each pill.)

29. ℞. Cupri ammon.-sulph. gr. xij; extr. gent. pulv. calumb. āā ʒss. M. optime; divide in pil. xxxvj; sumat unam bis quotidie. (In epilepsy, chorea, &c.)

30. ℞. Liquor. arsenical. ♏ iv; decoct. cinchon. ʒx; syrup. aurant. ʒij; tinct. opii ♏ v. M. fiat haustus, bis in die post cibum sumendus. (This combination has been found useful in obstinate intermittents, in periodic headaches, inveterate neuralgic affections, and also in some obstinate affections of the skin. It should be given after a meal, so that the gastric mucous membrane may be protected from it, and its use should be at once discontinued, as soon as there is a sign of gastric irritation, as thirst, nausea, and anorexia.)

31. ℞. Arsen. protox. gr. j; pip. nigri gr. xij; pulv. acac. gr. ij; aquæ destillat. q. s. Misce optime, et fiat massa in pilulas xvj. dividenda. (This is the celebrated Asiatic pill; the dose is one pill to be taken daily in lepra vulgaris, lepra tuberculosa, lupus, psoriasis.)

32. ℞. Infus. cinchon.; infus. ros. comp. āā ℥iv. M. fiat mistura; sumat cochlearia iij. ampla ter quotidie. (A light tonic in convalescence.)

33. ℞. Infus. cascarill. infus. rhei āā ʒiij ; aq. cinnam. ʒiv. Fiat haustus bis in die sumendus.

34. Calumb. rad. incis. cascar. cort. contus ā ʒi ; aquæ fervent. ℥vi ; macera per horas duas, et cola ; liquori colato adde tinct. calumb. ʒiij ; spir. ammon. arom. ♏xxx ; syrup. aurant. ʒij. M. sumat cochleare unum magnum ter in die. (A light tonic in convalescences from febrile diseases.)

35. ℞. Decoct. cinchon. ℥viss ; acid. hydrochlor. ʒiss ; mellis ℥iss. M. fiat gargarisma. (In cynanche maligna.)

36. ℞. Infus. cinchonæ cordifoliæ ℥iss; tinct. cinchon. comp. ʒj ; tinct. cascarillæ ℈ij ; syrup. aurantii ʒss. M. fiat haustus, secunda quâque horâ sumendus. (An agreeable tonic and stomachic in intermittents, and in cases of chronic debility.)

37. ℞. Infus. rosar. comp. ʒxi ; quinæ disulph. gr. j—ij ; acidi sulph. arom. ♏ x ; spirit. æther. sulph. comp. ʒj ; tinct. opii ♏ xij. M. fiat haustus, bis in die capiendus. (A useful tonic and antispasmodic in cases of angina pectoris.)

38. ℞. Quinæ disulph. gr. j—ij ; infus. rosar. comp. ʒxi ; infus. rosæ comp. ℥iss. M .fiat haustus, ter die sumendus. (An excellent corroborant in the profuse perspiration attending on gangrenous affections, lumbago, &c.)

39. Quinæ disulph. gr. v ; aq. font. ℥vj ; acid. sulphuric. dil. ♏ xxxv. M. fiat mistura ; sumat cochl. duo magna secunda quâque horâ. (In the gangrenous appearance of wounds and ulcers in broken-down constitutions.)

40. Limaturæ ferri ; pulv. rhei āā gr. v ; sacchari albi gr. x. M. fiat pulvis ; sumat unam quotidie. [In scrofula, the dose may be increased to two or three powders in the day.]

41. ℞. Rad. rhei ; cort. cascarill. āā ʒss ; tinct. ferri tartrat. q. s. ut fiant pilulæ xv ; sumat duas omni mane.

42. ℞. Vini albi ; rad. gent. ℥ss ; rad armoraciæ ʒj ; cort. aurant. ʒj ; cinnam. ʒss ; potass. carbon. ʒj ; sepone et serva. [Of this preparation, called gentian wine, an adult may take about half an ounce every morning, and children two teaspoonfuls mixed with sugared water in scrofula.]

43. ℞. Infus. cinchon. ℥j; tinct. card. comp. ; spirit. piment. t. āā ʒij ; spirit. lavand. comp. ʒss. M. fiat haustus. [A good carminative draught ; may be given occasionally in cases of tympanitis, where there is much gaseous fluid in the stomach and intestines.] Or the following may be substituted :

℞. Infus. quassiæ ℥j; tinct. calumbæ; spirit. canni āā ʒij; ol. anisi ♏ ij. M. fiat haustus.

44. ℞. Cascarillæ cort. contus. calumbæ rad. incis. āā ʒj; aquæ fervent. ℥vj; liquori frigefacto et colato adde tinct. calumbæ, ʒiij; spirit. ammon. arom. ♏ xxx; syrup. aurant. ʒiij. M. fiat mistura; sumat cochleare j majus bis die. [A good tonic and stomachic in infantile fever.]

45. ℞. Infus. calumbæ ℥vj; tinct. cinnam. comp. ʒij; syrup. aurant. ʒij. Fiat mistura, cujus cochlearia duo majora quarta quâque horâ sumantur. [In debilities of the digestive organs, and to check the severe vomiting which often occurs during pregnancy.]

46. ℞. Decoct. cinchon. cordif. ʒx; liquoris potassæ arsenitis, ♏viij; syrup. zingib. ʒj. M. fiat haustus, ter in die sumendus. [A good combination in intermittents.]

47. ℞. Zinci sulphat. pulv. cinnam. comp. āā gr. xij; opii gr. j; syrup. q. s. M. divide in pilulas sex. [One of these pills may be given three times a day, in some of the fenny districts of England, in intermittents.]

48. ℞. Infus. rosæ comp. ʒx; quinæ disulphatis, gr. ij; syrup. aurant, ʒj. M. fiat haustus, secundâ quâque horâ sumendus. [This is in common use as a tonic in cases of intermittent fever.]

49. ℞. Infus. cort. angusturæ ℥vj; tinct. cinchon. comp. ʒj; tinct. calumbæ ʒvj. M. capiat cochl. ij magna ter quaterve in die. [A good tonic in yellow fever.]

50. ℞. Infus. gentian. comp. ℥vj; tinct. card. comp. tinct. calumbæ āā ʒvj. M. capiat cochl. ij. mane, horâ meridiana, et vespere. Adde pro re natâ acid. sulph. dil. gts. xx. [A good stomachic bitter to restore the appetite in convalescence from fevers, &c.]

51. ℞. Pulv. rhæi, zingiberis āā ʒss; extracti anthemidis ʒj. Fiat massa, in pil. xxx div. quarum capiat tres ante prandium quotidie. [Given in dyspepsia and chlorosis.]

52. ℞. Liquor calcis, ℥vss; magnes. carb. ʒss; spirit. ammon. arom. ʒj; tinct. rhæi ʒiij. Fiat mistura, sumat cochl. duo magna bis die. [This mixture is successfully employed in various cases of herpes labialis, in conjunction with the following pills :

℞. Extract. colocynth comp. extract. āā jalapæ ℈j; pil. hydrarg. gr. x. M. forma in pil. x. quarum sumat ij nocte, ad alvum laxam tenendam.

53. ℞. Infusi cascarillæ ℥iss; tinct. cascarillæ; tinct. zingiberis āā ʒj. M. fiat haustus, bis quotidie sumendus. [In dyspepsia, arising from intemperance.]

54. ℞. Myrrhæ gr. v; potassæ nitratis gr. iv; syrup. papav. ʒss; infus. calumbæ ℥ss. Fiat haustus, ter in die sumendus. [In humoral asthma, chronic catarrh, and other diseases of the lungs unattended by much active inflammation.]

55. ℞. Infus. rad. calumbæ ℥iv; tinct. cort. cinchon. tinct. card. comp. āā ℥ss. M. fiat mistura, cujus sumat cochl. ij magna bis terve in die. [This mixture is tonic and stomachic, and is useful for strengthening the stomach in gout.]

56. ℞. Infus. aurant. comp. ℥v; quinæ disulph. gr. iv. magnes. sulph. ℈ij; tinct. card. comp. ℥ss. acidi sulph. dilut. ♏x. M. sumat cochl. ij. majora bis die. [A good tonic in palpitation, arising in irritable and debilitated habits.]

57. ℞. Infus. gentian. comp. ℥v; ferri sulph. gr. iv; magnes. sulph. ʒj; acidi sulph. dil. ʒss; syrupi ʒij; tinct. aurantii ʒiss. M. sumat cochl. ij. majora bis die. [May be given with advantage in cases of chronic debility.]

58. ℞. Aquæ destillatæ ℥iss; quinæ disulphat. gr. ij; acidi sulphur. arom. gtts. xvi; syrup. caryophyll. ℥ss. M. sumat ʒi—ʒij ter in dies. (This may be considered an adequate substitute for all other bitters in treating the cases of children—the object of it is to bring on appetite, by which means, strength will soon be restored by the use of nutritious food.)

59. ℞. Aq. destill. ℥ij; iodinii gr. v; hydriodatis potass. gr. x. M. sumat gutt. ij—v in pauxillo aquæ saccharatæ. (This is a useful form for the employment of iodine in the cure of young children labouring under a cachectic state, more especially if unhealthy inflammation or glandular enlargement be present.)

60. ℞. Infusi gentianæ comp. ʒiij; aq. carui ʒvj; acidi nitric. dilut. ♏x; syrupi ʒj. M. fiat haustus, ter in die sumendus. [A good tonic in those cases of dyspepsia which arise from the abuse of spirituous liquors.]

61. ℞. Decoct. cinchon. cordif. ʒx; ammon. sesquicarb. gr. iv; tinct. cascar. ʒij; syrupi aurantii ʒj. M. fiat haustus, ter

in die sumendus. [This is found useful in the weakened stomach caused by continuing to give suck too long; or the following:

℞. Infus. gentian. comp. ℥iiss; magnes. sulph. ℈iv; ferri sulph. gr. iv; acidi sulph. dilut. ♏xxx; tinct. card. comp. ʒvj; aquæ ℥iij. M. Sumat cochl. meridie majora ij et vespere.

62. ℞. Extr. anthemid. ℈ii; quinæ disulphat. gr. xij; massæ pil. galban. comp. ℈i; camphor. subact. gr. xv; syrup. papav. q. s. M. et divide in pilulas xxiv; sumat unam ad duas vel tres bis terve quotidie. [This is an excellent tonic and antispasmodic pill, and especially beneficial in the case of nervous females.]

63. ℞. Cort. cascar. contus. cort. simaroubæ āā ʒij; coque ex aquæ fontan. lb. j ad ℥viij. colat. adde spirit. cinnam. ℥j; tinct. kino ʒij. M. capiat cochl. magna iij. ter quaterve in die. [This is a useful tonic in long-protracted cases of dysentery.] Or the following:

℞. Infus. cort. angust. ℥vj; tinct. calumb. ℥j; tinct. catechu ʒij; spirit. pimento ℥ss. M. fiat mistura. [To be taken as the foregoing one, and in the same cases.]

64. ℞. Decoct. cinchon. ℥iss; tinct. cinchon. comp. ʒij; tinct. kino ʒj; tinct. lavand. comp. ʒss. M. fiat haustus, quartis horis sumendus. [This is an excellent tonic in several cases of chronic debility.]

65. ℞. Cinchonæ lancifoliæ in pulverem crassum redactæ unciam, radicis calumbæ incisi drachmas tres; caryophyll. contritorum drachmas duas; rament. ferri semunciam; digere per tres dies in vase clauso, subinde agitans, una cum aquæ menth. piperit. unciis tredecim.; liquori colato adde tinct. cardam. comp. ℥iij; tinct. aurant. cort. ʒiij. M. sumat ʒiv—℥ij. [This is the celebrated tonic which went by the name of Heberden's Ink, and is a very efficient preparation where tonics are indicated, as in chlorosis, scrofula, &c. &c.]

66. ℞. Mistur. camphor. ʒx; spirit. ammon. fœtid. ♏xx; syrupi ʒj. M. fiat haustus, ter die sumendus. [Found useful in chlorosis.]

67. ℞. Infus. cascarillæ; mistur. camphor. āā ʒvj; tinct. castor. ʒss. M. fiat haustus, bis in die sumendus. [For improving the digestive powers in dyspepsia.]

68. ℞. Infus. gentian. comp. ℥v ; tinct. cinchon. comp. ℥j ; tinct. calumbæ ʒss. M. fiat mistura ; capiat cochl. iij. ter in die ; adde pro re natâ acid. sulph. dilut. gtts. xv. ad xx. [A good tonic during convalescence from typhus and other acute diseases.]

69. ℞. Tinct. ferri sesquichloridi ʒiss; tinct. calumbæ ʒij ; infus. gentian. comp. ℥ij ; aq. cinnam. ℥ss ; syrupi ℥ss. M. sumat cochl. ij. majora bis in dies. [This is a powerful tonic in chlorotic cases.]

70. ℞. Ferri potassio, tartratis gr. iij ; pulv. rhæi gr. j, pulv. calumbæ ; pulv. cinnam. comp. āā gr. ij. M. fiat pulvis, ter in dies sumendus. [May be given in the worm affections of children, to strengthen the general system.]

71. ℞. Chlorid. ferri gr. iv ; moschi gr. v ; aq. destillat. ℥ij ; syrup. cort. aurant. ℥i. M. sumat cochleare unum parvum singulis horis. [As a tonic and astringent in gastromalacia or softening of the stomach ; the vomiting and purging may be allayed by this, and also by the external application of the volatile liniment, and by aromatic fomentations ; the following mixture also being used alternately with it.]

℞. Tinct. ferri muriat. gutt. x ; extr. cinchon. frigore parati gr. viij ; aq. flor. aurant. ʒij ; syr. cort. aurant. ʒi. M. cochleare parvum singulis horis. [In gastromalacia—*see* Heidelberg, Klin. Annalen. 1835.]

72. ℞. Decoct. rad. altheæ ℥ij ; gum. arab. ʒij ; ferri chlorid. ℈ss ; syrupi altheæ ʒvi. M. sumat. cochleare unum parvum secundis horis. [In gastromalacia.]

73. ℞. Infus. calumb. ʒvi ; sodæ carbonat. ʒss ; tinct. rhæi ʒiv ; sumat cochlearia duo ampla post unam pilularum sequentium ter in die.

℞. Pil. fœtid. comp. ℈ii ; divide in pilulas decem.

74. ℞. Infus. gentianæ comp. ℥viij ; tinct. calumbæ ʒj ; tinct. card. c. ʒj ; sodæ subcarb. ℥ss. M. fiat mistura ; cujus sumat cochl. larg. ij ; bis vel ter in die. [An excellent tonic and stomachic for restoring the appetite in convalescence from several diseases.]

75. ℞. Pulv. myrrh. ʒss ; spirit. cinnam. ℥ss ; ferri sulph. gr. iij ; potass. subcarb. gr. x ; aq. pimento ℥j. M. fiat haustus, ter die sumendus. [This is a good tonic for restoring the appetite and tone of the stomach in indigestion.]

76. ℞. Sodæ subcarb. gr. xij; extract. taraxaci ʒj; infus. calumbæ et infus. sennæ comp āā ℥ss; spirit. ammon. arom. ʒss; tinct. card. comp. ʒj. M. fiat haustus primo mane capiendus. [A useful tonic and sedative in chronic duodenitis.]

77. ℞. Acidi hydrochlor. ʒj; syrup. limon. ℥ss; aq. font. ℥viiss. M. sumat partem sextam quartâ quâque horâ. [A good tonic and antiseptic in cases of scarlatina.]

78. ℞. Decoct. cinchon. ʒx; confect. aromat. ℈j; tinct. cinchon. comp. ʒj; syrupi. ʒj. M. fiat haustus, sextis horis sumendus. Vel:

79. ℞. Infus. serpentariæ, mistur. camphoræ, āā ʒv; spirit. æther. sulph. comp. ʒss; spirit. ammon. aromat. ʒj; liquor. opii sedat. ♏x; syrup. croci, ʒss. M. fiat haustus, ter in die sumendus. [Given with advantage in the advanced stages of malignant scarlatina.]

80. ℞. Pulv. cinchon. flav. ʒss; tinct. cinchon. comp. ʒij; aq. cinnam. ℥iss; tinct. opii ♏xij; acid. muriatic. ♏viii. M. fiat haustus, secunda vel tertia quâque horâ sumendus. [Tonic in the low stage of typhus gravior, when petechiæ are beginning to make their appearance.]

81. ℞. Gentianæ gr. v.; alcohol. ℥i. Solve.—fiat tinctura, cujus sumat ʒss. ex aquæ semicyatho. [This is a bitter tonic obtained from the root of the gentiana lutea.]

82. ℞. Decoct. cinchon. flav. ℥v; potass. subcarb. ʒss; succi limon. ℥j. M. capiat cochl. ij. bis terve in die. [A good tonic in weakened habits.]

83. ℞. Chlorureti calcis gr. viij; tinct. calumbæ ʒiij; aq. menth. virid. ℥vj. M. fiat mistura, cujus sumat cochl. j vel ij. larga ter quaterve quotidie. [This mixture is beneficially administered in diarrhœas attendant on abortion.]

84. ℞. Tinct. cinchon. comp. ℥v; tinct. cantharid. tinct. camph. comp. āā ℥ss. M. sumat ʒi. ter in die ex hordei decocto. [In hooping-cough.]

85. ℞. Hydr. submur. pulv. antimon. comp. āā gr. ij; opii gr. j. M. fiat pil.

86. ℞. Potassæ bicarb. ℈j; succi limon. ℥ss; quinæ disulph. gr. i; syrup. aurantii, ʒj; aquæ ʒvj. M. fiat haustus, quartâ quâque horâ sumendus. [The draught should be given as above directed, and the pill at bed-time, in quotidians and double quartans.]

ASTRINGENTS.

1. ℞. Infus. rosæ comp. ʒx; acidi sulph. dil. ♏xxx; syrupi ʒj. M. fiat haustus, tertiâ quâque horâ sumendus. [This is a powerful astringent in cases of hæmorrhage from the lungs.]

2. ℞. Pulv. rhæi. gr. xv; magnes. calcin. ʒss; aq. anethi ℥iss; syrup. papav. alb. ʒiss; spirit. ammon. pur. ♏ xx. M. fiat mistura, cujus sumantur cochl. ij. minima bis terve in die. [This is an excellent remedy in the diarrhœa arising in children during dentition.]

3. ℞. Confect. opii. gr. xv; aq. cinnam. aq. pimento āā ʒvi; tinct. kino ʒj; tinct. lavand. comp. ʒss. M. fiat haustus, quartâ vel sextâ quâque horâ sumendus. [In cases of diarrhœa which arise towards the close of dysenteries.]

4. ℞. Mistur. cretæ ℥iv; extract. hæmatoxyli ʒss; aq. piment. ℥j; tinct. kino ʒj; syrup. zingib. ʒij. M. fiat haustus. [In obstinate diarrhœa this draught may be repeated every fourth hour.]

5. ℞. Elect. catechu ʒj; aq. cinnam. ℥ij; aq. font. ℥iv; tinct. kino ʒij; opii. ♏L. M. fiat mistura. [Two tablespoonsful of this mixture may be taken three or four times a day in obstinate diarrhœa.]

6. ℞. Mist. cretæ ʒx; gutt. nigr. ♏iv. M. fiat haustus. [An anodyne draught to be taken after each evacuation in diarrhœa.]

7. Tinct. opii ♏lx; tinct. catechu ʒiv; decoct. amyli ℥iv; fiat enema statim injiciendum.

8. ℞. Mistur. cretæ ℥iv; extract. lign. camp. ʒj; tinct. catechu ʒij; aq. cinnam. spirit. pimentæ āā ℥j; tinct. opii ♏ xxxx. M. fiat mistura, cujus sumat cochl. ij. magna tertiâ quâque horâ. [A powerful astringent in the diarrhœas attending on typhus, and in broken-down constitutions.]

9. Elect. catechu ʒj; aq. cinnam., aq. pimentæ āā ℥iss; aq. fontan. ℥ij; tinct. kino ʒij; tinct. opii gts. xxxx. M. fiat mistura, cujus sumat cochl. ij. magna quartis horis. [May be used in diarrhœa arising from a variety of causes.]

10. ℞. Decoct. hordei ℥vj; mel. rosæ ℥j; acid. sulph. dil. ♏xxxv. M. fiat gargarisma. Vel:

11. ℞. Infus. rosæ ℥vi; tinct. myrrhæ ℥ss; mel. commun. ℥j. M. [These gargles are of great benefit for washing the throat and fauces in inflammatory sore-throat.]

12. ℞. Acidi sulphur. diluti ♏xx. Infus. ros. comp. ℥ij. M. fiat haustus ter in die sumendus. [In profuse perspiration.]

13. ℞. Ammoniæ sesquicarbonat. gr. x; confect. aromat. ℈j; tinct. opii ♏xl; aq. pur. ℥viij. Sumat ℥i tertiis horis. [In debility occasioned by excessive purging.]

14. ℞. Zinci sulphat. gr. vij—xij; solve in aq. destill. ℥i; adde aq. laurocerasi, ℥ij. Cochleare unum parvum injiciendum quater in die. [An astringent injection in gonorrhœa.]

15. ℞. Mistur. cretæ comp. ℥j; confect. aromat. ℈j; tinct. cinnam. c. ʒj; tinct. opii ♏v. M. Sumat haustum post singulas dejectiones liquidas. Vel:

16. ℞. Pulv. cretæ comp. ℈j; aquæ cinnam. ʒix; syrup. papav. ʒj. Misce: fiat haustus, sextis horis repetendus. [Useful in several forms of diarrhœa.]

17. ℞. Mist. cretæ ℥iss; tinct. opii ♏x; tinct. catechu ʒj. M. fiat haustus, post singulas sedes liquidas sumendus. [In diarrhœa of some standing.]

18. ℞. Plumb. acet. ℈j; tinct. thebaic. gtt. lx; aq. fontan. tepidæ ℥ij. M. ut fiat enema. [In uterine hæmorrhage.]

19. ℞. Infus. rosæ acidulat. ℥vj; potass. nitrat. pur. ʒj. M. fiat mistura, cujus sumat cochl. magna iij tertiâ quâque horâ [This is used as an astringent in hæmorrhage from the nose.]

20. ℞. Acid. sulph. dilut. ♏xx; aq. font. ℥iss; syrup. rosæ ʒij; tinct. opii ♏xv. M. fiat haustus ter in die sumendus. [A useful astringent in epistaxis, and other hæmorrhages.]

21. ℞. Extracti hæmatoxyli gr. xij; aquæ cinnam. ʒx; tinct. catechu ʒj. M. fiat haustus, quarta quâque horâ, vel post dejectiones singulas liquidas, sumendus. [This is a powerful remedy in diarrhœas and protracted dysenteries.]

22. ℞. Decoct. cinchon. ℥ij; alumin. pur. gr. xij; tinct. kino ʒj; tinct. opii ♏xx. M. fiat haustus, tertiâ quâque horâ sumendus. [A good remedy in immoderate flow of the menses.]

23. ℞. Olei tereb. ♏xv; aq. menth. piper. ℥j. M. fiat haustus, quartis horis repetendus. [In internal passive hæmorrhage.]

24. ℞. Extr. hematox. gr. xv; tinct. krameriæ rhataniæ ʒi; aq. cinnamom. ʒxv. M. fiat haustus, quartis horis sumendus. [In the latter stages of diarrhœa and dysentery.]

25. ℞. Catechu extracti ʒij; aquæ cinnam. ℥viij; tinct. opii ♏xx. M. fiat mistura, cujus sumantur cochlearia tria magna post singulas dejectiones liquidas. [Given in the last stage of diarrhœa or dysentery.]

26. ℞. Hydrarg. cum creta, pulv. ipec. comp. āā gr. vj. M. fiat pulvis, bis die sumendus. [When the bowels are relaxed, and the motions pale and frothy, in the various forms of intermittent and remittent fevers.]

27. ℞. Confect. aromat. ʒij; aq. cinnam. ℥j; aq. font. ℥iij; tinct. catechu. ʒij. M. fiat mistura, cujus sumat cochl. ij magna post singulas sedes liquidas. [An excellent remedy in the diarrhœas sometimes attending on the low stages of týphus fever.]

28. ℞. Infusi rosæ ℥vij; tinct. catechu ʒvj; acidi sulph. dil. ʒj; tinct. opii ʒiss. M. sit gargarisma sæpe utendum. [A good application in relaxations of the uvula.]

29. ℞. Infus. catechu comp. ʒvij; tinct. opii ♏vij; syrup. papav. ʒj. M. fiat haustus, sextis horis repetendus. Vel:

30. ℞. Pulv. kino comp. gr. x; aq. cinnam. ℥j; syrup. zingib. ʒj. M. fiat haustus, ter in die sumendus. Vel:

31. ℞. Decoct. granati ʒvj; liquor. calcis ʒiv; tinct. opii ♏vj; tinct. cinnam. comp. ʒj. M. sumat haustum ter in dies. [These are powerful astringents in diarrhœa.]

32. ℞. Plumb. acet. gr. iv.—xij; aq. destill. ℥iij; acid. acet. dil. ʒij; aceti opii ♏xl; syrup. papav. ʒv; fiat mistura—cochleare unum amplum tertiis horis. [In hæmorrhages from stomach and intestines, lungs, uterus, &c.]

33. ℞. Plumb. acet. opii āā gr. vi; pulv. sacch. ℈ij. M. divide in pulveres xij. Sumat unum nocte maneque. [In the colliquative diarrhœa and sweating of phthisis.]

34. ℞. Zinci sulphat. gr. xij; myrrhæ pulv. ℈ij; confect. ros. q. s. ut fiant pil. xij; sumat unam ter die. [In phthisis or chronic bronchitis with profuse expectoration, also in leucorrhœa, &c.]

35. ℞. Ligni hæmatoyxli ℥ij; aq. bullient. ℥x; decoque per horæ quadrantem, et cola,

℞. Liquor. colati ℥vij; cretæ prepar. sacchari purificat. āā ʒij; mist. acaciæ ℥j. Sum. cochlearia duo ampla quartis horis, phialâ prius agitatâ. [This is a valuable astringent in chronic diarrhœa attended with acidity. Should acidity not exist, the chalk may be omitted, and tinct. opii or syrup. papav. may be substituted; and then the dose is one table-spoonful every two hours.]

36. ℞. Decoct. cinchon. cordifol. ʒxj; acidi sulph. dil. ♏xx; tinct. card. comp. ʒj; syrupi ʒj. Fiat haustus, sextis horis sumendus. [Given in cases of pulmonary hæmorrhages.]

37. ℞. Plumbi. acetatis. gr. iij; aceti. destillat. ʒij; tinct. digital. ♏xv; aquæ destillat. ʒx. M. fiat haustus, quartis horis repetendus. [Given in pulmonary and other internal hæmorrhages.]

38. ℞. Infus. cascarillæ ʒx; tinct. kino ʒj; aluminis ℈j. M. fiat haustus, quartis horis repetendus. [Astringent in internal hæmorrhages.]

39. ℞. Infus. catechu. comp. ʒx; extract. hæmatoxyli. gr. xv; tinct. cinnam. comp. ʒj; syrupi ʒj. M. fiat haustus, ter die repetendus.]

40. ℞. Aq. destillat. ℥iss. plumb. diacetat. gr. ss; tinct. opii ♏xx; syrup. rosæ ʒj. M. fiat haustus, sextâ quâque horâ sumendus. [A powerful astringent in internal hæmorrhages.]

41. ℞. Infus. rosæ ℥ij; potass. nitrat. gr. xv; tinct. opii ♏xx. M. fiat haustus, tertiâ vel quartâ quâque horâ sumendus. [A useful refrigerant and astringent in hæmoptysis.]

42. ℞. Acid. sulph. dilut. ♏xxx; aq. font. ℥iss; tinct. opii ♏xx; syrup. rosæ ʒj. M. fiat haustus. [May be taken every three or four hours in hæmoptysis and other internal hæmorrhages.]

43. ℞. Gum. kino gr. viij; aluminis gr. x; opii gr. j; conserv. rosæ q. s. Fiat bolus quartâ quâque horá sumendus. [May be given in hæmoptysis, &c.]

44. ℞. Infus. rosæ ℥iss; aluminis gr. x; zinci sulph. gr. x; tinct. opii ♏x; syrup. rosæ ʒj. M. fiat haustus, quartis horis sumendus. [This is a powerful remedy in cases of internal hæmorrhage.]

45. ℞. Infus. ros. comp. ℥iss; acid. sulph. dil. ♏xv; syrup. ʒi. M. fiat haustus, quartis horis repetendus. [In hæmorrhage.]

46. ℞. Infus. cascar. ℥vi; pulv. kino comp. ʒj; syrup. papav. ʒiv. Fiat mistura unde sumat cochlearia duo ampla sextis horis. [In chronic diarrhœa.]

47. ℞. Pulv. ipecac. gr. iss; alum. gr. vj; syrup. papav. q. s. M. fiat bolus, quartis horis repetendus. [In chronic dysentery.]

48. ℞. Confect. catechu ʒij; aq. cinnam. ℥ij; aq. puræ ℥iij; tinct. kino ʒij; tinct. opii ♏xxxx. M. sumat æger cochl. ij. vel iij. ter in die. Vel:

49. ℞. Mistur. cretæ ℥iv; spirit. cinnam. ℥j; tinct. catechu ʒij; opii ♏xxxx. M. fiat mistura. [These are good astringent and absorbent medicines in the diarrhœas supervening on aphthous affections, and in which there is a morbid excess of acid in the primæ viæ.]

50. ℞. Unguent. saturnin. ℥ss; pulv. alumin. ʒij; pulv. opii pur. ʒss. M. [An astringent ointment to be applied in the case of piles.]

51. ℞. Alum sulph. gr. viij—gr. xvi; aquæ ros. ℥iv. M. fiat collyrium. [In the chronic stage of ophthalmia.]

52. ℞. Aquæ ros. ℥vi; zinci sulph. gr. xij. M. collyrium.

53. ℞. Liq. plumb. diacet. ʒss; unguent. cetacei ℥j. M. fiat unguentum. [In ophthalmia tarsi.]

54. ℞. Unguent. sambuci. pulv. gallarum, āā ℥ss; liquor plumbi dil. ʒj. M. fiat unguentum. [This is a good application in piles, when the mucous membrane of the rectum is much relaxed with profuse bleeding.]

55. ℞. Liquor. plumb. diacet. ℈j—ij; aq. ros. ℥viij; vini opii ʒj. M. fiat collyrium. [In scrofulous inflammation of the eyelids.]

56. ℞. Plumb. acetat. gr. xij; suberis usti gr. iv; butyri non salsi ℥i. M. fiat unguentum. [In hæmorrhoids.]

57. ℞. Pulv. gallar. ℥i; opii pulv. gr. xv; adipis suillæ ℥i. M. fiat unguentum. [Hæmorrhoids.]

58. ℞. Sulph. zinci, acetatis plumbi āā gr. viij; aq. destillat. ℥vj. M. fiat collyrium. [A cooling wash to abate heat and irritation in ophthalmia.]

59. ℞. Hydrarg. chlor. gr. ij; ammon. mur. gr. v; aquæ font ℥vj. M. fiat collyr. [A good wash in ophthalmia depending on a venereal taint.]

60. ℞. Adipis suillæ ℥j; camphor. ʒss; pulv. gallarum ʒij; tinct. opii ʒj. M. fiat unguentum. [An excellent external application in piles.]

61. ℞. Cort. querc. contus ℥j; aq. font. lbij; coque ad lbj; colaturæ adde aluminis ʒij; tinct. opii ʒj. M. fiat injectio. [A powerful astringent for suppressing internal hæmorrhages in cases of piles.]

62. ℞. Unguent. spermaceti. camphor. āā ℥ss; pulv. opii ʒss. [This is an excellent local application in cases of piles. A small bit of it should be well rubbed into the hæmorrhoidal tumour two or three times a day with the point of the finger.

63. ℞. Nitrat. argenti gr. xvi; aq. destill. ℥viij. M. fiat enema. [Has been given with good effect in chronic diarrhœa.]

EMETICS.

1. ℞. Pulv. ipec. ʒss; antim. tart. gr. j; tinct. scillæ ʒj; aquæ destil. ℥vij. M. fiat mistura cujus sumat quam primum cochl. maj. quatuor, et cochl. duo sextâ quâque parte horæ donec supervenerit vomitus. [In dropsies, before exhibiting the foxglove.]

2. ℞. Pulv. ipecacuanhæ gr. xij, vini ipecacuanhæ ʒij; aquæ communis ʒvj. M. fiat haustus emeticus, quam primum vel vespere sumendus. [For unloading the stomach in ordinary cases.]

3. ℞. Cupri sulphatis gr. x; aquæ destillatæ ʒx. M. fiat haustus, quam primum sumendus. [This excites immediate vomiting, and is useful when laudanum has been taken as a poison.]

4. ℞. Aquæ ℥i; vini ipecacuan. ℥ss; syrup. simpl. ℥ss. M. ʒi—ʒij ad effectum. [This is a good formula for an emetic for children.]

5. ℞. Aquæ destill. ℥i; liquor. antimon. potassio-tartrat. ℥ss; syrupi simplicis ℥ss; cochleare j—ij—iij omni horæ quadrantes ad emesim. [This is an efficient medicine for children in severe inflammatory affections of the chest; its action is generally accompanied by evacuation through the skin and bowels, and great depression of the system; when great depression is already present, ipecacuanha or squill is preferable as an emetic.]

6. ℞. Aq. destill. ℥i; vini ipecacuan. ℥ss; liquor. antimon. potassio-tartrat. ʒij; syrup. scillæ ʒij—ʒi—ʒij ad emesim.

7. ℞. Antimon. tart. gr. ij; aquæ puræ ℥ij; oxymel. scillæ ℥ss. M. capiat cochleare unum minimum, subinde ad vomitum promovendum. [Useful as an emetic in the commencement of croup.]

8. ℞. Pulv. ipecacuanhæ gr. xvi; vini antimon. ʒij; aquæ menth. pulegii ℥j. M. fiat haustus. [This draught may be given in continued fevers when there is foul stomach, a bad taste in the mouth, a feeling of nausea, and headache.]

9. ℞. Emetinæ puræ gr. i; solve in acidi acetici ♏x; adde aquæ flor. aurant. ℥iij; syrup. ℥i. M. fiat mistura unde sumat cochleare j amplum omni horæ quadrante donec supervenerit vomitus.

9. ℞. Emetinæ puræ gr. viij; sacchari albi ℥iv; muc. trag. q. s. Fiat massa in trochiscos cc dividenda. Sumat unum omni horæ quadrante ad quartam vicem, vel donec supervenerit vomitus. [This is a convenient form for administering an emetic to children; each of the above contains 1-25th of a grain of emetine.]

11. ℞. Pulv. ipecacuanhæ gr. xv; sulph. zinci. gr. v. M. [An excellent emetic, sometimes given in epilepsy at the approach of a fit, with the intention of cutting it short.]

12. ℞. Pulv. ipecac. gr. xv; aceti scillæ ʒj; aq. menth. virid. ℥j. M. fiat haustus emeticus. [May be given in asthma when the stomach is much loaded.]

13. ℞. Pulv. ipecac. gr. iij; aceti destillat. ʒiij; aq. menth. pulegii ʒvj. M. fiat haustus, quartis horis ad quartam vicem repetendus. [Useful for keeping up a degree of nausea in asthma.]

14. ℞. Sinapis pulv. ℥ss; aq. tepidæ ℥xij. M. sumat dimidium statim, et quod restat post horæ quadrantem, si opus sit. [This is a good form of emetic in cases where the sensibility of the stomach is diminished, or where the depressing effects of ordinary emetics would be dangerous, as in cases of poisoning by narcotics, in paralysis, cholera, &c.]

15. ℞. Cupri sulph. gr. viij; aq. destill. ℥ij. M. fiat haustus emeticus. [Useful in cases of narcotic poisoning, when the stomach is rendered insensible to the influence of the ordinary emetics.]

16. ℞. Zinci sulph. ℈j; confect. ros. can. q. s. ut fiat bolus, statim sumendus. [Indicated where the rapid action of an emetic is required, and a state of nausea is to be avoided, so favorable to the promotion of absorption, as in the case of poisoning.]

PURGATIVES.

1. ℞. Mist. acaciæ ℥ij; aq. cinnam. ℥iij; olei ricini ℥iss; tinct. rhæi ʒvi; tinct. opii ʒss; syrup. aurant. ʒvi. Sumat unciam tertiis horis. (In dysentery.)

2. ℞. Elect. sennæ ℥ij; potass. bitartrat. ℥ss; ferri carbonat. ʒij; syrup. zingib. q. s. ut fiat electuarium. Sumat cochleare minimum meridie nocteque. (A useful combination of a tonic and purgative in habitual costiveness.)

3. ℞. Olei ricini ʒvi; spir. lavand. comp. ʒss; tinct. opii gtts. x; syrupi zingib. ʒi; aquæ cinnam. ℥i. M. fiat haustus statim sumendus. (To relieve pain in the bowels.)

4. ℞. Elect. sennæ ℥iv; flor. sulphur. potass. bitartrat. āā ℥j; syrup. zingib. q. s. ut fiat electuarium. Sumat cochleare minimum bis terve in die. (In hæmorrhoids.)

5. ℞. Pulv. jalapæ, pulv. zingib. āā ʒij; pot. bitartrat. ʒiv; syrupi q. s. ut fiat electuarium. Sumat cochleare minimum mane, meridie et vesperi. (In dropsy.)

6. ℞. Extr. hyoscyam pil. hydr. āā gr. iv. M. fiant pilulæ duæ, nocte sumendæ.

7. ℞. Decoct. al. comp. ℥ss; spir. ammon. comp. ʒss; inf. aur. comp. ʒvi. M. fiat haustus.

The above pills and draught have been found very effectual in cephalalgia dependent on a congested state of the vessels of the head, and accompanied with a torpid state of the bowels.

8. ℞. Infus. sennæ. ℥iss; magnes. sulph. ʒvj; mannæ opt. ʒij. M. fiat haustus. (A safe purgative draught in the generality of cases requiring such an agent.)

9. Fol. sennæ. ʒiij; aquæ font. ℥xij; coque leniter ad ℥x; et colat. adde magnes. sulph. ℥j; ol. olivæ ℥j. M. fiat enema. (Useful in febrile and other diseases, when it may be necesssry to empty the lower bowels.)

10. ℞. Aloes. socot. pulv. rhæi āā ʒj; pulv. aromat. ℈j; sapon. Venet. ʒss; syrup. rhamni q. s. Fiat massa in pil. xxx. quarum sumat ij. pro dosi. (These are good purgative pills for removing habitual costiveness in dyspeptic habits.)

11. ℞. Magnes. sulph. ʒj; mistur. salinæ ℥j; tinct. hyoscyami ʒss. M. fiat haustus, quartis horis sumendus. (May be given in cases of confined bowels with pain and irritation, in compound fractures, and lumbago.) When the pain in the iliac region is very severe in the latter affection, and aggravated on pressure, the following pills may be given:—

12. ℞. Subm. hydrarg. gr. j; opii gr. ss; antim. tart. gr. $\frac{1}{6}$; confect. aromat. q. s. Fiat pilula, quartâ vel sextâ quâque horâ sumenda.

13. ℞. Pil. rhæi comp. gr. vj; subm. hydrarg. gr. ij; extract. hyoscyami gr. iij. M. fiant pil. duæ. pro re natâ sumendæ. (In costiveness with irritation, in various surgical and other diseases in which the patient is confined to bed.)

14. ℞. Extr. elater. gr. ij; potass. bitartr. ʒi; zingib. ℈j; misce, et divide in pulveres iv. Sumat j. bis in die, et repetatur diebus alternis. (A hydragogue purgative in ascites.)

15. ℞. Aloes ℈j ; pulv. rhæi ʒss ; ipecacuan. gr. x ; olei carui gtts. vi. M. fiant pilulæ xij. Sumat unam ante prandium. (A useful dinner pill.)

16. ℞. Infus. sennæ ℥i ; aq. menth. ℥ss ; mannæ ʒij ; magnes. ℈j ; tinct rhæi ʒi ; syrup. ros. ʒij. M.—ʒi—Ʒij. tertiis horis ad effectum.

17. ℞. Pulv. rhæi ℈j ; magnes. ℈ij ; pulv. cinnam. gr. x. M. grana quatuor tertiis horis. (For a child six months old—six or ten grains required after twelve months.)

18. ℞. Pulv. rhæi ℈j ; hydr. c. creta gr. x ; pulv. arom. gr. v. M. gr. iij—gr. v. tertiis horis.

19. ℞. Infus. sennæ ; aq. pimentæ āa ℥i ; potassæ tartrat. ʒij ; tinct. cort. aurant. ʒi. M. ʒi—ʒiij tertiis horis. (A good purgative for children.)

20. ℞. Pulv. jalapæ Ʒss ; pulv. ipecacuan. gr. v ; chloridi hydrarg. gr. v ; sacchari albi gr. x. M. gr. ij—vi tertiis horis. (For children.)

21. ℞. Pulv. scammon. ʒss ; pulv. cretæ comp. gr. xv ; pulv. aromat. gr. v. M. gr. ij—gr. vj. tertiis horis. (For children with worms or obstinate constipation, &c.)

22. ℞. Olei ricini Ʒiij ; olei terebinthinæ ʒij ; misturæ acaciæ, Ʒiij ; aquæ menthæ viridis, ʒvj. M. (An excellent purgative draught in epileptic cases ; it may be given in the morning, a calomel bolus having been administered the night before.)

23. ℞. Hydrarg. submuriatis, gr. ij ; pulv. ipecacuanhæ, gr. j ; pulv. rhæi, gr. iv ; extr. aloes, gr. ij. M. F. pilulæ ij. horâ somni sumendæ. (Excellent purgative pills in epilepsy. They may be given occasionally at bed-time, and on the following morning a saline aperient.)

24. ℞. Pulv. scammon. gr. x ; subm. hydrarg. gr. v ; supertart. potass. Ʒss ; pulv. zingib. gr. v. Fiat pulvis pro dos. (A good hydrogogue purgative in dropsical cases.) Vel:

25. ℞. Extract. colocynth. comp. gr. viij ; subm. hydr. gr. ij ; pulv. zingib. gr. ij ; ol. juniper ♏jv. M. fiant pil. ij. pro dos.

26. ℞. Pulv. rhæi gr. vi ; hydr. c. creta gr. iv. (or) calomelanos gr. ij ; fiat pulvis. (For children under two years of age,

exhibiting the precursory symptoms of cerebral congestion. In about one hour and a half after the powders, from two to three tea-spoonsful of castor-oil may be given.)

27. ℞. Subm. hydrarg. gr. v ; pulv. jalapæ ℈j. M. fiat pulvis catharticus. Vel:

28. ℞. Pulv. jalapæ comp. ℈ij ; aquæ cinnam. ʒx ; tinct. jalap. syrup. zingib. āā ʒj. M. fiat haustus aperiens. (These are good purgatives in cases of scarlatina when high inflammatory action prevails in the throat, with a dry and burning skin.)

29. ℞. Infus. ros. ℥iss ; magnes. sulphat. ʒvi ; tinct. hyoscyam. ♏xxv. M. fiat haustus. (A purgative intended to act as a revulsive and depletory remedy in menorrhagia. It should be resorted to the week before the expected menorrhagic period.)

30. ℞. Infus. sennæ comp. ℥viij ; magnes. sulphat. ℥i ; olei ricini ℥i ; aquæ calefactæ ℥viij. M. fiat enema. (This enema is useful in the treatment of cerebral congestion, and in determination to the head.)

31. ℞. Infus. sennæ comp. ℥viij ; magnes sulph. ℥i ; olei ricini ℥i ; aquæ tepidæ ℥viij. M. fiat enema. (A useful purgative enema in congestive states of the brain threatening apoplexy.)

32. ℞. Hydrarg. submur. gr. iv ; extract. colocynth. comp. gr. vj. Forma in pilulas duas. (These pills may be occasionally administered in case of costiveness, with pain in the region of the liver, in chronic agues.)

33. ℞. Potass. tart. ℥ss ; mannæ opt. ℥j ; aquæ fervent. ℥iv. M. fiat solutio, cujus sumat dimidium, et repetatur dosis post horas duas nisi alvus prius respondeat. (A useful aperient in febrile diseases.)

34. ℞. Electuar. lenitiv. ℥ij ; sulphur. depurati ʒi ; syrup. rosar. q. s. ut fiat electuar.

35. ℞. Olei ricini, ʒv ; vitel. ovi, q. s. aquæ rosæ, ℥viij ; tinct. lavand. c. ♏viij ; syrup. papav. ʒj. M. fiat haustus statim sumendus. (In colic, and calculous affections.)

36. ℞. Potassæ sulph. ʒij ; aquæ fontanæ ℥vj ; tinct. jalapæ ʒiv ; sit mistura. cujus sumat cochl. duo magna omni bihorio. (A useful purgative in many diseases.)

37. ℞. Extract. colocynth. comp. ʒss; pulv. rhæi gr. xxiv; subm. hydr. gr. vj. M. et div. in pil. xij æquales—sumat unam omni mane et nocte. (This is a very good purgative pill in cases of habitual costiveness.)

38. ℞. Pulv. rhæi ʒiss; pil. hydrargyri gr. xxiv; saponis ʒss. M. et div. in pil. æquales xxiv; sumat tres vel quatuor pro re nâta. (Given in cases of costiveness arising from a deficiency of bile in the intestines.)

39. ℞. Hydrarg. subm. pulv. Jacobi, āā gr. iv; extract. colocynth. comp. gr. iij. M. fiant pil. duæ. (A good purgative in simple fever, when the pulse is active and the skin dry.)

40. ℞. Hydrarg. subm. gr. iij; pulv. Jacobi, gr. ij; pulv. rhæi, gr. x. M. fiat pulvis. (May be given with advantage in the typhoid fevers of this country.)

41. ℞. Infusi sennæ ℥iss; tinct. sennæ comp. ʒj; potassæ tart. ʒj; syrup. croci ʒss. M. fiat haustus, quam primum, vel primo mane sumendus. [May be given as a purgative in a variety of acute diseases.]

42. ℞. Infus. rosæ ʒx; magnes. sulph. ʒij; acidi sulph. dilut. ♏x; mannæ ʒij. Fiat haustus, quartis horis sumendus. [A useful remedy in inflammatory affections.]

43. ℞. Magnesiæ carb. ʒj; pulv. rhæi ℈j; aquæ menth. pip. ʒxij; tinct. card. comp. ʒj. M. fiat haustus, hora ante prandium sumendus. [Given in dyspepsia, attended with costiveness.]

44. ℞. Infus. sennæ comp. ʒx; pulv. colchici gr. viij; tinct. jalapæ ʒj; syrup. mori ʒj. M. fiat haustus catharticus. [A good purgative in cases of acute rheumatism.]

45. ℞. Magnes. calcin. ℈j; magnes. sulph. ʒj; vin. colchici ♏xx; aq. menth. virid. ʒiij; aq. puræ ℥j. M. fiat haustus, quâque horâ adhibitus. [Anodyne and aperient in acute rheumatism.]

46. ℞. Extract. colchici acetici, gr. j; extract. colocynth. comp. pil. hydrarg. āā gr. ij. M. fiat pilula, bis die sumenda. [In acute rheumatism.]

47. ℞. Ol. ricin. ℥ss; mist. acaciæ q. s. aq. menth. pip. ℥j; tinct. opii ♏xxv. M. fiat haustus, sextâ quâque horâ sumendus. [This is a mild cathartic in dysenteric cases, attended with griping and tenesmus.]

48. ℞. Subm. hydrarg. gr. v; extract. colocynth. comp. gr. vj; opii gr. j; ol. carui ♏iij; contunde simul et fiant pil. ij. quarta quâque horâ sumendæ. [May be given in several diseases of the intestinal tube when the stomach is irritable and unable to bear liquid medicines.]

49. ℞. Magnes. sulph. ʒiij; infus. rosæ ʒx; syrup. caryoph. ʒj. M. fiat haustus, quartâ quâque horâ repetendus si erit necessitas. [May be given as an aperient in bilious affections.]

50. ℞. Extr. colocynth. comp. ℈j; pulv. scammon.—Jacob. āā gr. vj. M. div. in pil. sex.—sumat ij. omni nocte.

51. ℞. Decoct. aloes. comp. ℥j; infus. sennæ comp. ℥ss; sodæ sesquicarb. gr. x. M. fiat haustus, omni mane sumendus. [These are useful purgatives in chorea.]

52. ℞. Pulv. rhæi ℥ss; magnes. calcin. ℥j; pulv. zingib. ʒij. M. sumat cochl. min. pro dosi. [This is a good carminative and aperient in cases of headach, dependent on disease of the stomach. It may be administered in a glass of mint or cinnamon water.]

53. ℞. Infus. sennæ comp. ℥v; potass. tart. ℥j; tinct. jalapæ, sennæ comp. āā ʒiij; syrup. rhamni ʒij. M. sumat partem quartam, quartâ quâque horâ, donec alvus plene soluta sit. [A good active purgative in phrenitis and other highly inflammatory diseases.]

54. ℞. Pulv. rhæi. pulv. jalapæ āā ℈j; subm. hydrarg. gr. v; ol. carui ♏iij; mist. acaciæ q. s. Fiat massa in pil. x div.; sumat ij vel iij pro dosi. [May be given as a gentle aperient in cases of tympanitis.] Or the following:

55. ℞. Extract. colocynth. comp. gr. xxiv; subm. hydrarg. gr. vj; ol. carui ♏iv. M. et in pil. vj dividenda ij pro dosi. pro re natâ.

56. ℞. Ol. ricini ʒi; mistur. acaciæ ʒij; aquæ puræ ʒv; aq. flor. aurant. ʒj; syrupi ʒj. M. fiat haustus. [A good laxative in peritonitis.] Or the following:

57. ℞. Magnes. sulph. ʒij; mistur. amygdal. ʒx; tinct. hyoscyami ♏xx. M. fiat haustus pro re natâ. Another good purgative in such cases is,

58. ℞. Fruct. tamarind. ℥j; folior. sennæ ʒij; semin. coriand. ʒss; sacchari ℥ss; aq. bullient. ℥viij; macera in vase

clauso, et post horas duas cola. Sumat coch. tria maj. secunda quâque horâ, donec alvus soluta sit.

59. ℞. Hydrarg. submur. gr. v; pulv. antim. comp. gr. iv; extract. colocynth. c. gr. iij. M. fiant pil. duæ. [To be given occasionally in acute inflammation of the liver.]

60. ℞. Sem. anisi contus.; flor. anthem. āā ℥ss; coque ex aq. font. ℔iss ad ℥x. et colaturæ adde sulph. sodæ ʒvj; ol. olivæ ℥j. M. fiat enema. [This forms a good injection in cases of flatulent colic where medicines given by the mouth have failed to open the bowels.]

61. ℞. Pulv. rhæi ℈j; spirit. anisi ℥ss; aq. cinnam. ℥j; tinct. jalap. ʒj. M. fiat haustus, statim sumendus. [May be given in the obstinate costiveness of colic, arising in hysteria.]

62. ℞. Pil. hydrarg. gr. iij; pulv. ipecac. gr. j; extract. colocynth. comp.; extr. hyoscyami āā gr. ij; sapon. duri gr. i. M. fiant pil. duæ horâ somni sumendæ. [These are excellent pills in duodenal dyspepsia.]

63. ℞. Pil. aloes cum. myrrh. ℈ij; extract. hyoscyami ℈j. M. div. in pilulas xij; sumat j. vel ij. omni nocte. [A good pill in chlorosis.]

64. ℞. Infus. sennæ compos. ℥iss; tinct. sennæ ʒij; spir. ammon. aromat. ʒss; tinct. cardam. comp. ʒi. M. fiat haustus.

65. ℞. Elect. sennæ ℥iij; pulv. jalap. ʒij; potass. nitrat. ʒiss; syrup. simpl. q. s. Fiat electuarium de quo sumat magnitud. juglandis pro re natâ. [This has been found of great efficacy in hæmorrhoidal affection, as it keeps the bowels in a gently lax state.]

66. ℞. Flor. sulphur. ℥j; elect. sennæ ℥ij; potass. bitartrat. ʒiij; syrup. rosæ q. s. Fiat electuarium. [A dessert spoonful of this electuary may be taken occasionally in piles, with the intention of keeping the bowels open.]

67. ℞. Extracti aloes, gum. galbani āā gr. ij; saponis duri gr. j. M. fiat pil. [This is an excellent purgative pill in epileptic diseases; one of them may be given every night at bed-time when the bowels are confined.]

68. ℞. Infus. calumb. infus. rhæi āā ℥iij; magnes. sulphat. ʒiv; tinct. sennæ comp. tinct. aurant. āā ʒvi. M. sumat

cochlearia duo ampla ter in die. [A useful tonic purgative for pregnant females.]

69. ℞. Mist. camphor. decoct. al. comp. āā ℥iij; magnes. sulph. ℥i; tinct. jalapæ ℥ss; sumat cochlearia duo ampla omni mane. [A good purgative for females troubled with habitual costiveness.]

70. ℞. Extract. colocynth. comp. gr. xx; subm. hydr. gr. v; ol. carui ♏iij. M. fiat massa in pil. vj. div. [Two of these may be given at a time in case of obstinate costiveness in nervous diseases.]

71. ℞. Extract. colocynth. comp. gr. vj; subm. hydr. gr. iv; opii gr. j. M. div. in pil. duas pro dosi. [These pills are good in colic, &c.]

72. ℞. Extract. colocynth. comp. ʒss; pil. hydrarg. gr. xxiv; subm. hydrarg. gr. vj; opii pur. gr. vj; syrup. q. s. Fiatmassa in pil. xij. divid.; sumat unam mane nocteque. [This is a good purgative pill in hepatic diseases.]

73. ℞. Aquæ menth. piper. ℥vi; magnes. sulphat. ℥i; acidi sulphur. dilut. ♏xx. M. sumat cochlearia tria ampla omni mane. [In irregular menstruation, two of the following pills to be taken every night.]

74. ℞. Pil al. c. myrrhâ ʒss; divide in pilulas sex. Sumat duas singulis noctibus.]

75. ℞. Infus. sennæ ℥iss; magnes. sulph. ʒiij; tinct. sennæ, syrup. rosæ āā ʒj. M. fiat haustus. [A good purgative in jaundice and liver disease.]

76. ℞. Pulv. rhæi gr. xxiv; aloes socot. gr. xij; pulv. zingib. gr. xij; ol. anthem. ♏iv. M. div. in pil. x; sumat j. vel ij. nocte. [These are mild aperients in dyspepsia.]

77. ℞. Pulv. aloes, pulv. rhæi āā gr. xx; pulv. ipecac. sapon. hispan. āā gr. xij; tere simul, et fiat massa, in pil. x. div.; sumat j. vel. ij. pro dosi. [Very useful in several cases of dyspepsia.]

78. Pil. rhæi comp. ℈ij; extract. colocynth. comp. extract. hyoscyami āā ℈j. M. div. in pil. xv; sumat j vel ij nocte. Vel:

79. ℞. Extract. colocynth. comp. ʒss; extract. jalapæ ℈j

subm. hydrarg. gr. vj; extract. hyoscyami gr. xij. M. div. in pil. xij; sumat j vel ij nocte, horâ decubitûs. (These are excellent formulæ in the different forms of dyspepsia.)

80. R. Electuar. sennæ, flor. sulphur. āā ℥i; pulv. jalap. ʒi; bals. copaib. ℥ss; pulv. zingib. ℥ss; potass. tartrat. ʒss; syrupi zingib. q. s. ut fiat electuarium. Sumat cochleare parvum mane atque vesperi. (In hæmorrhoids.)

81. ℞. Decoct. al. comp. ℥iss; extr. glycyrrh. ʒij; vini al. ℥ij—℥i—℥ij bis terve in die. (To act on the biliary secretion in children, and to remove ascarides.)

82. R. Decoct. hord. ℥v; mur. sodæ ʒiij; ol. oliv. ʒv; olei tereb. ʒi—ʒij. Fiat enema.

83. ℞. Pulv. aloes, pulv. gambogiæ saponis, extr. hyoscyami āā ʒj; fiant pilulæ xx. una vel duæ horâ somni sum. (These are good opening pills in many forms of indigestion.)

84. ℞. Hydrargyri subm. gr. iij; pulv. jalap. sacchari, sing. gr. x. M. sit pulvis, vespere vel primo mane sumendus. (This is a good powder in bilious fevers, and slimy and obstructed bowels.)

MILD APERIENTS.

1. ℞. Olei ricini ℥i; magnes. carbon. ʒi; syrupi zingib. ℥i; optime conterantur donec in unum coeant; sumatur quarta pars hujusce misturæ secundis horis. (This laxative mixture has been much recommended in the treatment of remittent fevers.)

2. ℞. Hydr. c. creta gr. x; pulv. rhæi gr. viij; pulv. ipecac. gr. iij. M. fiant pulveres duo; sumat unum horâ somni. (This combination of a laxative with a diaphoretic is recommended in the chronic form of infantile remittent. Should there be much restlessness, Dover's powder may be substituted for the ipecacuanha.)

3. ℞. Infus. rosæ comp. ʒxj; magnes. sulph. ℥ss; syrupi ʒj. M. fiat haustus. (To be given in case of acute inflammation of the liver.) When the stomach is irritable, the following will be preferable when given in a state of effervescence:

4. R. Sodæ potassio-tartratis, ʒij; sodæ sesquicarbonatis ℈j; aq. destillat. ℥j; tinct. lupuli ♏xxx; syrupi ʒj. M. sumat cum succi limonis coch. j. majora.

5. ℞. Pil. hydrarg. gr. iij ; pulv. ipecac. gr. ij. M. fiat pil. horâ somni sumenda.

6. ℞. Infusi sennæ comp. ℥j ; pulv. rhæi ℈j ; tinct. sennæ, tinct. card. c. syrup. zingib. āā ʒj. M. fiat haustus, mane sequenti sumendus. (These medicines may be prescribed for persons labouring under torpidity of the liver.) Or the following may be substituted in robust constitutions :

7. ℞. Subm. hydrarg. gr. iij; extract. colocynth. comp. gr. iv. M. fiat pil. j. horâ decubitûs sumenda.

8. ℞. Infus. gentianæ comp. ʒx ; sulph. magnes. ʒiij ; spirit. ammon. c. ʒss. M. fiat haustus, mane sumendus.

9. ℞. Confect. sennæ, ℥j ; sulphuris loti ℥ss ; syrup. tolut. q. s. Fiat electuarium, cujus sumat cochl. duo minora omni mane. (In hæmorrhoidal affections.)

10. ℞. Pulv. rhæi gr. xij ; magnes. calcin. ℈j ; aq. cinnam. ℥iss ; tinct. lav. c. ʒss. M. fiat haustus. (This is a mild aperient in dysentery.)

11. ℞. Pil. hydrarg. pil. galbani comp. extract. colocynth. comp. āā gr. iv ; fellis bovini inspissati gr. ij. M. fiant pil. iij. pro dosi. (A useful antispasmodic aperient in epilepsy.)

12. ℞. Sulphuris ʒi ; magnes. sulphat. ʒss ; potass. bitartrat. ʒij ; aquæ octarios duos. Solve ; sumat ℥iss omni mane. (This is an artificial Harrowgate water, and has been employed with advantage in the treatment of lepra vulgaris.)

13. ℞. Magnes. sulph. gr. ij ; potass. sulph. ʒj ; aquæ fœniculi ℥iv ; spirit. æther. nitros. vin. antim. tart. spirit. junip. comp. ăā ʒj ; syrup. scillæ ʒij. M. capiat infans ʒj—ʒij ; ter quaterve quotidie. (A useful remedy in inflammation of the brain in children.)

14. ℞. Hydrarg. subm. gr. iij ; pulv. Jacobi gr. vj ; extract. hyoscyami gr. iv. M. fiant pil. duæ. (These are given to clear the primæ viæ and diffuse the circulation in cases of influenza.)

15. ℞. Ol. ricini, mist. acaciæ āā ℥ss ; aq. fervent. ℥j ; potass. tart. ʒij. M. fiat haustus. (A mild aperient in several disorders.)

16. ℞. Infus. sennæ comp. ʒix ; potass. bitart. ℈j ; tinct.

jalapæ ʒij; pulv. zingiber. gr. v; syrupi ʒj M. fiat haustus, omni mane sumendus. (A gentle aperient, very efficacious during the period of desquamation in scarlatina, to encourage the due action of the bowels.)

17. ℞. Potassæ tart. ʒiij; mannæ opt. ʒij; aquæ fervent. ℥iij; aquæ cinnam. ℥ss. M. capiat dimidium pro dosi. (A mild aperient in a variety of affections.)

18. ℞. Pulv. rhæi ʒss; pulv. ipecacuanh. gr. xij; subm. hydrarg. gr. vj; mist. acaciæ q. s. Fiat massa in pil. xij æquales div. quarum sumatur una ter in die. (This is a good pill in dysenteric cases.)

19. ℞. Pulv. rhæi ʒss; tinct. sennæ comp. ʒiij; aq. menth. pip. ℥j; spirit. ammon. aromat. ʒj. M. fiat haustus. (This draught may be repeated according to circumstances in spasmodic colic.)

20. ℞. Pulp. tamarind. ℥ss; crystal. tartar. ʒij; aq. bullient. ℥v; colat. adde aq. cinnam. ℥j; antim. tart. gr. j. M. sumat cochl. iv. et rep. dos. post horas duas, nisi alvus prius responderit. (A mild aperient in febrile diseases.)

EMMENAGOGUES.

1. ℞. Decoct. aloes comp. ℥j; sub-boratis sodæ ℈j; tinct. aloes comp. ʒi; tinct. castor. ʒj; tinct. croci ʒss; aquæ cinnam. ʒij; M. fiat haustus, ter in die capiendus. (In difficult menstruation.)

2. ℞. Ferri sulph. ʒss; potassæ carb. gr. x; myrrhæ ʒj; pulv. aloes comp. ʒss. contunde simul, et div. in pil. xxx; sumat tres bis quotidie. (These are given with advantage in amenorrhœa with a languid pulse.)

3. ℞. Ferri sulph. potassæ carb. āā ℈j; myrrhæ pulv. ʒj; aloes pulv. ʒss; theriacæ q. s. M. et div. in pil. xxx—ij vel iij pro dosi mane nocteque. (Given in chlorosis and dysmenorrhœa.) Vel:

4. ℞. Pil. aloes cum myrrh. pil. ferri comp. āā ℈ij; pil. galban. comp. ʒss; ol. juniperi sabini ♏vj. Contunde simul, et fiat massa, in pil. xxx distribuenda; capiat binas mane nocteque. Vel:

5. ℞. Aloes spicat. extract. ʒiss; myrrhæ gum. resin. ʒij; ferri sulph. ℈ij; theriacæ q. s. Simul contunde, et in pil. lx. div.—sumat ij bis quotidie.

6. ℞. Pil. galban. comp. pil. aloes cum myrrh. āā ℈ij. M. divide in pil. xx; sumat ij bis quotidie. (At the same time either of the following preparations of iron may be taken in cases of difficult menstruation.)

7. ℞. Mist. ferri comp. ℥iss; aquæ cinnam. ℥ss. M. fiat haustus, ter die sum.

8. ℞. Vini ferri ℥j; tinct. aloes comp. ʒvj; tinct. castor. ʒij. M. fiat mistura, cujus sumat cochl. j. min. ex cyatho infus. anthem. ter die.

9. ℞. Quininæ disulph. gr. xij; pil. aloes cum myrrhâ ℈iss. M. div. in pil. xij; sumat duas bis quotidie.

10. ℞. Pulv. Jacobi ver. ʒss; guaiaci resin. ʒss; pil. aloes cum myrrh. ℈ij; syrup. simp. q. s. div. in pil. xxiv; sumat duas ter die.

11. ℞. Pil. aloes cum myrrh; pil. ferri comp. āā ʒj. M. div. in pil. xxiv; quarum sumat ij—iij bis quotidie.

12. ℞. Pulv. myrrh. ℈j; ferri sulph. gr. iss; sodæ carb. gr. iv; tinct. croci ʒj; aquæ menth. pulegii ℥iss. M. fiat haustus, ter die sum.

ANTHELMINTICS.

1. ℞. Artemisiæ Santonicæ ℈j; hydrarg. chloridi gr. vj; pulv. rhæi ʒss; camphoræ gr. xij; syrup. simpl. q. s. M. div. in bolos ij; sumat unum mane, et alterum post horas sex, nisi prius bene dejecerit alvus. (Anthelmintic for expelling lumbrici and ascarides.)

2. ℞. Stanni pulv. ʒj; extract. artemisii absinth. pulv. jalap. āā ℥j; syrup. aurant. q. s. M. div. in bolos xij; sumat unum singulis semi-horis donec bene dejecerit alvus. (In ascarides, lumbrici, and tenia.)

3. ℞. Dolichi pubis mucunæ ʒj; theriacæ ℥i. M. fiat electuarium; sumat cochl. j. min. omni mane. (In lumbrici and ascarides, a purgative should be given every second or third day.)

4. ℞. Pulv. stanni, conserv. absinthii āā ℥ss; syrup. simpl. q. s. M. fiat electuarium, cujus sumat ʒj. omni mane nocteque. (A mechanical anthelmintic.) Vel:

5. ℞. Pulv. stanni ʒss; conserv. rutæ ℈j; syrup. zingiber. q. s. M. fiat bolus. After which may be given the following draught:

6. ℞. Ol. ricini ℥j; spirit. terebinth. ℥ss. M. fiat haustus. (This is a powerful anthelmintic, and has been found more efficacious than any other remedy in expelling worms of various kinds from the intestinal canal.)

7. ℞. Fol. sabinæ, rutæ, absinthii, āā ʒiij; coque ex aquæ puræ ℔j. ad ℥x; colat. adde ol. ricini ℥ss. M. fiat enema. (This forms an excellent injection for expelling ascarides from the rectum.

8. ℞. Tinct. ferri mur. ʒiv; aquæ ℥vij. M. fiat enema. (In ascarides, a purgative of jalap and calomel may be given occasionally.)

9. ℞. Ol. terebinth. ℥j; decoct. hordei frigid. ℥j. M. fiat haustus. (This dose may be repeated every morning for three days in tenia. If it does not purge within two hours, a dose of castor oil should be given.)

10. ℞. Hydrarg. chloridi gr. v; jalapæ ℈j; theriacæ q. s. M. fiat bolus. (In tenia, the medicine to be worked off by drinking plentifully of green tea.)

11. ℞. Decoct. filicis maris ℥iv; æther. sulph. ʒj. M. fiat haustus, mane sum., et postea sine mora injiciatur enema; decoct. filicis ℥x., cum æther. sulph. ʒij; post horam adhibeatur mistur. purg. scilicet;

12. ℞. Ol. ricini ℥ij; syrup. flor. persic. ℥j. M. (This is Boudier's treatment of tape-worm.)

13. ℞. Pulv. rad. granati cort. ℥ss; divide in pulveres vj; sumat unum omni semi-hora ad sextam vicem. (The last dose should be followed by an active aperient, as senna and salts.)

14. ℞. Cort. rad. punicæ granati ℥ij; aquæ ℔ij; macera per horas viginti quatuor; decoque ad ℔j; adde syrup. zingib. ℥j. M. div. in partes tres; sumat unam omni semi-hora ad tertiam vicem, incipiens mane. (This may be followed by a dose of castor oil and syrup of lemons.)

DIURETICS.

1. ℞. Potass. acetat. ʒj ; oxymel. scillæ ʒij ; aquæ fœnicul. dulc. ℥j ; spirit. junip. comp. ʒiij. M. fiat haustus, bis terve die sumendus. (In ascites and anasarca.)

2. Uvæ ursi ʒiss ; carbonat. sodæ exsiccat ʒss ; pulv. cinnam. comp. ʒss ; conf. ros. q. s. ; divide in bolos sex ; sumat unum ter quotidie. (In calculous affections and in chronic inflammation of the kidneys and bladder, three grains of extr. conii may occasionally be added.)

3. ℞. Rad. scillæ recent. ℥j ; cort. aurant. radicis calami aromat. āā ʒiij ; juniper. baccar. contus. ℥ij ; vin. alb. hispan. ℔iv ; digere per dies tres, cola et adde oxymellis scillæ ʒij. M. (This is recommended by Richter as a good diuretic drink in dropsies.)

4. ℞. Potass. bitart. ʒij ; sub-boratis sodæ ʒj ; infus. juniper. ℥viij ; spirit. juniper. comp. et spirit. æther. nitros. āā ℥iij ; syrup. papav. ℥ss. M. fiat mistura diuretica ; capiat æger cochl. ij. larga quartis horis. Vel :

5. ℞. Infus. juniper. ℥vij ; spirit. æther. nitros. ℥ss ; spirit. carui ʒvj ; tinct. cinchon. comp. ʒj. M. fiat mistura. (This may be taken as the above, and is a good tonic and diuretic in anasarca and ascites.)

6. ℞. Pulv. scillæ exsiccat. gr. xij ; pulv. digital. gr. xvj ; hydrarg. subm. gr. vj ; pulv. gum. myrrh. ʒss ; assafœtidæ ʒss ; syrup. q. s. fiant pil. xxiv. quarum capiat unam quater in die. (Given in cases where the dropsy is united with bronchitis.)

7. ℞. Gum. ammon. sapon. Venet. āā ℈j ; pulv. scillæ exsiccat. gr. x ; pil. hydrarg. gr. xv ; ol. juniper. ♏v ; extract. taraxaci ʒj ; fiat massa, quam div. in pil. xxx ; sumantur duæ bis terve quotidie. (Useful in dropsy, associated with torpor of the liver.)

8. Infusi digitalis, ʒiv ; liquor. oxymur. hydrarg. ʒij ; aquæ menth. sativ. ʒviij ; træ cantharid. ♏xxx. M. fiat haustus, bis terve in die sumendus. (In anasarca of some standing, where the inflammatory symptoms have ceased, and when the patient has now been labouring under effusion into the whole

cellular structure of the body; the great object being to unload the system by diuresis.)

9. ℞. Elaterii gr. ½; calomelanos, pulv. capsici, āā gr. ij. conf. ros. canin. q. s. ut fiat pilula, mane sumenda. (In anasarca arising from diseased heart, where the strength is yet unbroken.)

10. ℞. Aq. menth. virid. ʒi; aquæ puræ ℥ss; carb. potass. gr. xv; aceti destill. ʒvi; pip. jamaic., syrupi, aceti scillæ, āā ʒi. M. fiat haustus. (In anasarca arising from enlarged heart with attenuated parietes, and occurring in broken down constitutions.

11. ℞. Spirit. æther nitrosi ʒij; balsam. copaib. ʒi; mist. camphor. ℥iv; mist. acaciæ ℥i. M. sumat cochleare amplum ter quaterve in die. (This has been found beneficial in gleet.)

12. ℞. Liquor. potass. gutt. xx; extr. conii gr. iij; mist. camphor. ʒx; fiat haustus ter in die sumendus. (A valuable combination for relieving the pain of chordee.)

13. ℞. Antim. pulv. gr. xx; croci martis aperit. gr. xxv; pulv. scillæ gr. xij; gum. ammoniaci ʒj; extract. dulcamaræ ʒij; ol. juniperi q. s. M. contunde in massam, et div. in pilulas lx., quarum capiat binas vel tres bis terve in die. Vel:

14. ℞. Decocti spartii cacum. ℥x; potass. acet. ℈ij; spirit. æther nitros. et spirit. lavand. comp. āā ʒj. M. fiat haustus ter in die sumendus. Vel:

15. ℞. Decoct. spartii cacum. ʒx; liquor. ammon. acet. ʒss; spirit. æther nitros. ʒiss; tinct. scillæ ʒss; tinct. capsici ♏x. M. fiat haustus ter die capiendus. (These are good diuretics in the various forms of dropsy.)

16. Tinct. digitalis ♏xij; tinct. calumbæ ʒiss; spirit. æther. nitr. ʒj; spirit. juniper. comp. ʒj; mistur. camphoræ ℥iss. M. fiat haustus bis quotidie sumendus. Vel:

17. ℞. Pulv. scillæ gr. j; potass. nitrat. gr. vj; sodæ subcarb. exsiccat. gr. viij; sacchar. purif. ʒi; ol. anisi ♏iij; tere bene simul, et fiat pulvis ter in die capiendus.

18. ℞. Potass. carb. ʒiss; potass. nitratis ʒss; tinct. colchici ʒiij; tinct. aurant. comp. ʒiij; infus. juniper. ℥vij. M. capiat cochl. ij; vel iij, larga quartis horis. (These are all excellent diuretics in the several cases in which their use may be required.)

19. ℞. Infus. digital. aquæ anethi āā ℥iiss ; potass. aectat. ʒiiss ; scillæ acetatis ʒiij ; tinct. opii ♏x. M. fiat mistura, cujus capiat cochl. ij, larga bis terve quotidie.

20. ℞. Pulv. scillæ gr. ij ; pulv. digital. gr. j ; pil. hydrarg. gr. vj ; olibani pulv. gr. x ; ol. juniper. ♏iv. Fiat massa in pil. quatuor div. e quibus capiat ij horâ somni.

21. ℞. Bitart. potass. ʒij ; pulv. aromat. gr. v ; pulv. digital. gr. j. M. Fiat pulvis ter in die sumendus. (A good diuretic in dropsy.)

22. ℞. Infus. juniperi ℥v ; spirit. junip. comp. ʒss ; spirit. æther. nitrosi ℥ij ; potass. acetat. ʒi ; syrup. aurant. ʒvi ; sumat ℥i tertiis horis. (In dropsy.)

23. ℞. Gum. myrrh. ʒss ; solve in spirit. junip. comp. ℥ss ; et adde aq. menth. sativ. ℥v ; sulph. ferri ℈j ; spirit. æther. nitros. ℥ss. M. fiat mistura cujus capiat æger cochl. iij. quartis horis. (This is much recommended as a tonic and diuretic in hydrothorax.)

24. ℞. Balsam. copaib. ʒij ; pulv. pip. cubeb. ʒiv—ʒvi ; opii gr. ij ; magnesiâ additâ fiat massa in partes sex æquales dividenda ; sumat unam mane, alteram meridie, et tertiam nocte. (This has been found on the continent a very effectual remedy for gonorrhœa. The above quantity thrice administered has effected a cure ; a day of of rest should be allowed to intervene between each renewal of the medicine.

25. ℞. Tinct. jalapæ ʒiij ; aceti scillæ ʒj ; aquæ menth. pip. ʒviij. M. fiat haustus ter in die sumendus. (A good diuretic in dropsical affections.)

26. Pulv. digitalis gr. xij ; hydrarg. submur. gr. iv ; opii gr. iv ; confect. rosæ. q. s. Fiant pil. duodecim ; sumat unam octava quaque horâ, (Given in hydrothorax, and ascites depending on some visceral obstruction.)

27. ℞. Pilulæ hydrarg. ʒj ; pulv. scillæ ℈j ; confect. rosæ q. s. Fiant pil. viginti ; sumat unam ter quotidie. (In ascites and anasarca.)

28. ℞. Liquor. ammon. acet. ʒiij ; tinct. digital. ♏xij ; aq. menth. pip. ℥ss ; syrupi rhœados ʒj. M. Fiat haustus, ter die sumendus. (A good diuretic to maintain the due action of the kidneys in cases of scarlatina.)

29. ℞. Potass. nitrat. gr. xij; spirit. æther. nitros. ʒj; vin. ipecac. ʒj; tinct. hyoscyami ʒj; mistur. camphor. ℥j; syrup. tolut. ʒj. M. fiat haustus statim sumendus. (A useful combination in some cases of asthma.)

30. ℞. Hydrarg. subm. gr. j; pulv. digital. gr. j—ij; zinci oxydi gr. iij; pulv. opii pur. gr. ss; syrup. tolut. q. s. Fiant pil. ij., bis terve quotidie sumendæ. Vel:

31. ℞. Tinct. digitalis ♏xvj; tinct. calumbæ ʒss; spirit. æther. sulph. ʒss; tinct. opii ♏vj; mistur. camphor. ʒx. M. fiat haustus bis quotidie sumendus. (These forms of prescription are much recommended in hydrothorax.) Vel:

32. ℞. Potassæ carb. ʒiss; potass. nitrat. ʒss; tinct. colchici ʒiij; tinct. aurant. comp. ʒiij; infus. junip. ℥vi. M. capiat cochl. ij vel iij larga quartis horis.

33. ℞. Liquor. ammon. acet. ℥ij; tinct. camph. comp. ℥j; tinct. scillæ ʒj; magnes. sulph. ℥j; infus. taraxaci ℥iv. M. capiat ℥ss., usque ad ℥iss tertiâ quâque horâ. Vel:

34. ℞. Spirit. colchici ammoniat. ʒij; potass. subcarb. ʒj; infusi genistæ ℥viij. Sumat ℥ss usque ad ℥iss. tertiâ quâque horâ. (The above are powerful diuretics in the different forms of anasarca, and other dropsical effusions.)

35. ℞. Aq. menth. piper; spir. vin. rectif.; bals. copaib. syrup. capill. veneris, āā ʒij; aq. flor. naphthæ ℥j; spir. ætheris nitr. ʒij. M. sumat cochlearia duo mane, unum meridie et aliud vesperi. (In gonorrhœa and glecty discharge.)

36. ℞. Cubebar. ʒiij; gumm. arab. ℈j; potass. nitrat. gr. vi; capiat talem dosin quartis horis in infuso seminum lini. (In gonorrhœa.)

37. ℞. Aq. cerasor. pulv. cubeb. āā ℥i; balsam. copaib. syrup. amygd. āā ℥ss; acid. sulph. dil. ʒss. M. cochleare parvum tertiis horis. (In gonorrhœa of a chronic form, and tending to gleet.)

38. ℞. Bals. copaib. ℥ss; ol. menth. piperit. gutt. iv; ol. caryophyll. gutt. i; tinct. opii ℈ij. M. sumat guttas triginta ter in die c saccharo.

39. ℞. Bals. copaib. syrup. tolut. āā ℥i; aq. rosar. ℥vi; gum. arab. ℥i; spirit. æther. nitr. ʒi. M. fiat emulsio. (One

half of this to be taken at night when going to bed, and the other half on awakening in the morning, and this to be repeated four or five times.)

40. ℞. Infus. junip. ℥viij; spirit. junip. comp. ʒj; spirit. æther. nitros. ℥j; acetatis potassæ ʒiij. M. fiat mistura. sumat æger cochl. ij magna quartâ quâque horâ. (This is a highly efficacious diuretic in anasarca and ascites.)

41. ℞. Nitratis potassæ purif. ℈ij; aq. fervent ℥xij; spirit. junip. comp. ℥iss; syrup. cort. aurant. ℥j. M. capiat cyathum vinar. quarta vel sexta quâque horâ. (A good diuretic in some dropsical affections.)

42. ℞. Potass. acet. ʒss; tinct. scillæ ʒi; aquæ fœniculi ℥i; spirit. armoraciæ c. ʒij; tinct. lavand. comp. ʒss. M. fiat haustus. Vel:

43. ℞. Aq. ammon. acet. ℥ss; aq. armoraciæ ℥j; spirit. æther. nitros. ʒj; tinct. lavand. comp. ʒss; syrup. zingib. ʒij. M. fiat haustus. (These are excellent diuretics in the various forms of dropsical effusions.)

Another powerful diuretic draught is the following:—

44. ℞. Aq. fœniculi dulcis ℥iss; tinct. cantharid. ♏xx; spirit. æther. nitros. ʒss.; syrup. cort. aurant. ʒij. M. fiat haustus.

45. ℞. Infus. gentian. comp. ℥j; tinct. cinchon. comp. ʒiij; tinct. cantharid. ♏xv. M. fiat haustus ter die sumendus. (A good tonic and diuretic for dropsy proceeding from debility.)

46. ℞. Infus. digitalis ʒvj; tinct. card. comp. ʒij; spirit. junip. comp. ʒij. M. fiat haustus ter in die sumendus.

47. ℞. Infus. pareiræ ℥viij; extr. ejusdem ʒij; tinct. hyoscyam. ʒij. M. fiat mistura; sumat cochlearia tria ampla ter quotidie. (In calculous affections, chronic inflammation of the bladder, rheumatism, &c.)

48. ℞. Decoct. senegæ ℥ss; spirit. junip. comp. et spirit. æther. nitr. āā ʒij; tinct. scillæ ♏xv. Fiat haustus tertiis horis sumendus. (In hydrothorax, attended with debility and great oppression of breathing.)

49. ℞. Infus. digit. ʒiv; potassæ acetat. ℈i; spir. æther. nitr. ʒi; aquæ cinnamomi ℥ss. M. fiat haustus, sextis horis repetendus.

50. ℞. Infus. diosmæ crenatæ (Buchu) ℥vij; tinct. diosmæ, tinct. cubebæ āā ʒiv. M. fiat mistura; sumat cochlearia duo ampla ter die. (In chronic affections of the prostate, bladder, and kidneys; in gravel, &c.)

51. ℞. Tinct. scillæ ʒij; spir. armoraciæ comp. ʒij; spir. æther. nitr. ʒiv; infus. calumb. ʒvij. Fiat mistura.

52. ℞. Pil. hydrarg. gr. iij; pulv. scillæ gr. j; pulv. digital. gr. j. M. fiat pil. meridie et vespere sumendæ. (Useful in various forms of dropsy.)

53. ℞. Tinct. scillæ ♏xx; extract. taraxaci ℈j; spirit. æther. nitros ʒj; aquæ carui ʒss. M. fiat haustus, ter die sumendus. (A good diuretic in ascites and anasarca.)

54. ℞. Ammon. sesquicarb. gr. viij; aceti scillæ ʒij; tinct. digital. ♏xx; aquæ pimentæ ʒx; syrup. zingib. ʒj. M. fiat haustus, ter die sumendus. (Diuretic in dropsies.)

55. ℞. Infus. digital. ʒiv; aquæ cinnam. ʒv; potassæ acetatis ℈j; spirit. æther. nitric., spirit. junip. comp. āā ʒj. M. fiat haustus, sextis horis repetendus. (This mixture is highly recommended in hydrothorax and hydropericardium.)

56. ℞. Infus. digital. ʒiv; liq. hydr. bichloridi ʒj; aq. menth. sat. ℥j; tinct. cantharid. ♏xxx. M. fiat haustus, bis vel ter in die sumendus. (This is a good diuretic in anasarca, and other forms of dropsy.)

DIAPHORETICS.

1. ℞. Liquor. ammon. acet. ʒvj; mistur. camphor. ʒx; vini ipecac. ♏xx; syrup. tolut. ʒss. M. fiat haustus sextis horis sumendus. (Used in fevers and inflammatory affections.)

2. ℞. Camphor. gr. iij; ammon. carb. gr. x; antim. tart. gr. $\frac{1}{6}$; conserv. prun, sylvest. q. s. Fiat bolus. (This is a good diaphoretic bolus in cases of acute rheumatism. It determines greatly to the surface, and may be repeated every four or six hours.)

3. ℞. Sodæ bicarbonat. gr. xv; aq. puræ ʒx; sp. æther. nitr. ♏xxx; spir. ammon. aromat. ♏xx. M. fiat haustus cum granis decem acidi tartar. pulveriz. in statu effervescentiæ sextis horis sumendus.

4. ℞. Succi limon. ʒss; ammon. carb. q. s. ad ejus saturationem; aq. puræ ʒvj; vin. antim. ♏xij; syrup. cort. aurant. ʒj. M. fiat haustus quartâ vel sextâ horâ sumendus. (A good diaphoretic in cases of gout, the patient drinking plentifully of mild diluents.)

5. ℞. Liquor. ammon. acet. ʒiij; potass. nitrat. gr. x; tinct. digital. ♏x; syrup. tolut. ʒj; aquæ ʒvj. M. fiat haustus salinus quartâ quâque horâ repetendus. (Refrigerant and diaphoretic in pneumonia.)

6. ℞. Vin. antimon. tart. ♏xx; liquor. ammon. acet. ʒiiss; potass. nitratis gr. v; aquæ puræ ʒx; syrup. crocei ʒss. M. fiat haustus, tertiâ vel quartâ quâque horâ sumendus.

7. ℞. Aq. destillatæ ℥viij; magnes. sulph. ℥i; antimon. potassio-tartratis gr. ss. M. sumat cochleare unum amplum omni horâ. (As a diaphoretic and purgative at the commencement of a febrile attack.)

8. ℞. Pulv. antim. gr. x; hydr. chloridi gr. xvi; pulv. opii gr. iv; confect. ros. caninæ. q. s. Divide in pilulas sex; sumat unam quartis horis.

9. ℞. Liquor. ammon. acet. ʒij; aq. menth. pip. destillat. ℥ss; vin. antim. ♏xx; syrup. ʒj. M. fiat haustus, quartis horis sumendus. Vel:

10. ℞. Magnes. sulph. ʒij; vin. antim. ʒiss; aquæ menth. pip. ℥iv; aq. lavand. comp. ʒij; syrupi ʒiij. M. fiat mistura, cujus sumatur pars sexta quartâ quâque horâ. (These are useful refrigerants and diaphoretics in typhoid fevers.)

11. ℞. Mistur. camphor. ℥ij; confect. aromat. ʒss; vin. antim. ♏xx; aq. cinnam. ℥iij. M. capiat cochleare magnum tertiâ quâque horâ. (A useful diaphoretic in cynanche maligna.)

12. ℞. Pulveris ipecacuanhæ gr. ij; opii gr. i; potassæ nitratis gr. xvi. M. fiat pulvis horâ somni sumendus. (Diaphoretic and anodyne in acute rheumatism.)

13. ℞. Ammon. carb. gr. x; pulv. antim. gr. ij; conserv. rosæ. q. s. Fiat bolus. (To be given occasionally in acute rheumatism.)

14. ℞. Pulv. antimon. gr. v; opii, hydrarg. subm. āā gr. j; confect. rosæ, q. s. Fiant pil. duæ horâ somni sumendæ. (Very useful in relieving pain in acute rheumatism.)

15. ℞. Pulv. Jacobi gr. iv; hydrarg. subm. gr. iij; pil. sapon. comp. gr. iij. M. fiant pil. duæ. Vel:

16. ℞. Hydrarg. subm. gr. iv; pulv. ipecac. comp. gr. viij. M. fiat pulvis. (These are good diaphoretics at the commencement of several acute diseases, as diarrhœa, dysentery, &c.)

17. ℞. Camphor. gr. iv; pulv. antim. gr. iss; conserv. rosæ. q. s. M. fiat bolus. (A good diaphoretic bolus in inflammations.)

18. ℞. Aq acet. ammon. ʒiv; sulph. sublim. ℥i; vin. ipec. ℥i; extr. opii gr. ij; aq. fœnic. dulc. syrup. sacch. empyreumat. āā ℥ij; sumat unciam omni horâ. (In anasarca, with albuminous urine, where the skin is dry.)

19. ℞. Tinct. guaiac. ammoniat. ℥ij; sulphur. loti ʒi; mist. camph. ℥j; spir. piment. ℥ss. Sumat ℥i omni horâ. (In anasarca, where there is a tendency to coldness of the surface.)

20. ℞. Potass. nitrat. gr. xx; ammon. hydrochl. gr. xij; mist. camphor. ʒvj; aquæ ʒx. Misce; fiat haustus, quartis vel sextis horis sumendus. (A good diaphoretic in inflammatory fever.)

21. ℞. Potass. bitart. in pulv. ℥j; potass. nitratis ʒij; confect. sennæ ℥ij; syrup. aurant. ℥j. M. fiat electuarium, cujus capiat cochl. j vel ij minima. (Diaphoretic in febrile diseases.)

22. Sodæ subcarb. gr. x; potass. nitrat. gr. viij; tinct. camphoræ comp. ʒj; mist. camphor. ʒx; syrup. aurant ʒss. M. fiat haustus, sextis horis sumendus. Vel:

23. ℞. Camphoræ rasæ gr. j; pulv. ipecac. comp. gr. iv; hydrarg. cum creta gr. iij; syrup. simpl. q. s., ut fiant pil. ij; sextâ quâque horâ sumendæ. (These are good stimulating expectorants and diaphoretics in some cases of fever after proper depletion.)

24. ℞. Camphoræ gr. j; potass. nitrat. gr. iij; pulv. acaciæ gr. ij; mist. acaciæ, q. s. Fiant pil. ij, quartis horis sumendæ. Vel:

25. ℞. Mistur. camphoræ ℥j; liquor. ammon. acet. ʒij;

ammon. hydrochl. gr. iv ; syrup. limon. ʒj. M. fiat haustus, quartâ quâque horâ sumendus. (These are good combinations of diaphoretic and diuretic remedies, occasionally found useful in typhus.)

26. ℞. Hydrarg. cum creta gr. ij ; sacchari alb. gr. iij. M. fiat pulvis. (This powder may be given every fourth hour in cases of infantile fever, in combination with the following draught :

27. ℞. Potassæ bicarb. gr. v ; succi limon. recent. ʒj ; syrup. ʒss ; aquæ ʒiij. M.

28. ℞. Bicarb. potassæ, ℈j ; succi limon. ℥ss ; sacchar. alb. ℈j ; aquæ destil. ℥j. M. fiat haustus, tertiâ quâque horâ repetendus. (This is a good refreshing diaphoretic throughout the early and middle periods of fever.)

29. ℞. Liquor. ammon. acet. ʒiij ; mistur. camphor. aquæ, āā ℥ss ; syrupi rhæados, ʒj. M. fiat haustus, sextis horis sumendus. (A powerful sudorific at the commencement of fever.) Vel :

30. ℞. Potass. bicarb. ℈j ; tinct. aurant. ♏xv ; aquæ, ℥j ; syrupi, ʒj. M. fiat haustus cum succi limonum cochl. j. majore in effervescentia sumendus.

31. ℞. Succi limon. ℥iss; kali præparat. ʒj ; aq. menth. sativ. ℥j, aq. font. ℥iij ; antim. tart. gr. iss ; syrup. caryoph. ʒij. M. fiat mistura cujus capiat cochl. ij. magna secundâ quâque horâ. (This mixture is a useful diaphoretic in cases of fever, the body being kept moderately warm during its use.) Or the following may be substituted :

32. ℞. Aquæ ammon. acet. aquæ cinnam. āā ℥ss ; aq. font. ℥j ; vin. antim. ♏xx ; spirit. æther. nitros. ʒss. M. fiat haustus, tertiâ quâque horâ sum.

33. ℞. Antim. potassio-tartratis gr. iss ; aquæ font. ℥vj ; syrup. caryoph. ʒij. M. fiat mistura cujus sumat cochl. ij. magna secundâ vel tertiâ horâ. (Given as a diaphoretic in fevers.)

34. ℞. Hydrarg. subm. gr. ij ; pulv. Jacobi ver. gr. v ; camphoræ gr. j ; extract. hyoscyami gr. v ; conserv. rosæ q. s. ut fiat bolus statim post venesectionem sumendus.

35 ℞. Mistur. camphor. ℥j ; liquor. ammon. acet. ʒij ;

potass. nitrat. gr. vj; spirit. æther. nitros. ♏xx; vin. antim. tart. ♏xxx; tinct. hyoscyami ♏xv; syrup. tolut. ʒj. M. fiat haustus, tertiis horis sumendus. (These are good diaphoretics in acute bronchitis, when the patient is young and of a full plethoric habit.)

36. ℞. Tinct. guaiac. volat. ʒij; spirit. cinnam ℥ss; aquæ font. ℥j; vin. antim. ♏xx. M. fiat haustus ter die sumendus. (In chronic rheumatism.)

37. ℞. Gum. guaiac. gr. xv; pulv. antim. gr. ij; confect. opii gr. x; syrup. q. s. Fiat bolus mane et vespere sumendus. (In chronic rheumatism.)

38. ℞. Mistur. camphor. mistur. amygdal. dulc. āā ℥ij; liquor. ammon. acet. ℥iss; spirit. æther. nitros. vin. antim. tart. āā ʒiss; syrup. tolut. ʒiss. M. capiat cochl. ij. larga secundâ quâque horâ. Vel:

39. ℞. Liquor. ammon. acet. ℥iv; vini antimon. tart. ℥ss; vini ipecac. ʒij; syrup. papav. ℥ss; aquæ destillat. ℥xv. M. capiat cochl. ij. larga quartis horis. (These are good diaphoretics and expectorants in acute bronchitis.) Vel:

40. ℞. Vin. ipecac. ℥iss; spirit. æther nitros. ʒiss; liquor. ammon. acet. ℥ij; vin. antim. tart. ʒiss; mistur. camphor. ʒiv; syrup. papav. ℥iij. M. capiat. cochl. ij. tertiâ quâque hora.

41. ℞. Liquor. ammon. acet. ℥iv; vin. antim. tart. vin. ipecac. āā ʒij; spirit. æther. nitros. ℥ss; syrup. papav. ℥j; extract. conii gr. xiv. M. sumat cochl. ij. magna ter quotidie. (A useful diaphoretic and anodyne in febrile and other diseases.)

42. ℞. Infus. digital. liquor. ammon. acet. āā ℥iss; potass. acet. ʒij; aceti colchici ʒij; tinct. opii ♏xij. M. fiat mistura, cujus sumantur cochl. ij. larga bis terve die. (A combination of diuretic and diaphoretic remedies very useful in dropsical affections.)

43. ℞. Pulv. ipecac. comp. gr. x; pulv. Jacobi gr. iii; subm. hydr. gr. ij; mist. acaciæ q. s. Fiant pil. ij. mane nocteque sumendæ. (This is a powerful sudorific, and of great use in dropsical cases. The patient while using them should drink plentifully of warm diluting fluids.)

44. ℞. Camphor. gr. v; pulv. Jacobi. ver. gr. iv; confect. aromat. gr. xij. M. fiat bolus, quartâ quâque horâ sumendus. (Diaphoretic in dropsy.) Or the following draught:

45. ℞. Aq. ammon. acet. ℥ss; aq. raphan. rustic. ℥j; vin. antimon. ♏xxx; spirit. ammon. ♏xx; syrup. zingib. ʒij. M. fiat haustus.

46. ℞. Mistur. camphor. ʒx; aq. ammon. acet. ʒiij; spirit. æther. nitr. ʒss. Fiat haustus tertiis horis capiendus. (Given in febrile and inflammatory diseases to determine gently to the surface.)

REFRIGERANTS.

1. ℞. Potass. nitrat. pur. ℈ij; aquæ fervent. ℥viij; antim. potassio-tartrat. gr. ij.; syrup. violæ ʒij. M. fiat mistura cujus sumat cochl. ij. magna pro dos. (This is a useful refrigerant in cases of acute inflammation in full habits.)

2. ℞. Haustus salin. ℥iss; potass. nitrat. pur. gr. x; vin antim. ♏xij; syrup. simpl. ʒj. M. fiat haustus tertiâ quâque horâ sumendus. (A good refrigerant in a variety of inflammatory affections.)

3. ℞. Liquor. ammon. acet. ℥iij; spirit. rect. ℥ij; aq. font. ℥vij. M. fiat lotio. (This is a good refrigerant application in phrenitis.)

4. ℞. Potass. subcarb. ℈j; syrupi ℥ss; spirit. myristicæ ʒss; aquæ destil. ℥j. Fiat haustus in effervescentia cum succi limonis cochl. magn. secundâ quâque horâ sumendus. (Given in the several varieties of febrile diseases.)

[For other formulæ of refrigerants see among the saline purgatives, as also among the diaphoretics, diluents, &c.]

EXPECTORANTS.

1. ℞. Mistur. ammoniaci. mist. amygdal. āā ʒiv; aceti scillæ ʒj; tinct. opii ♏iv. M. fiat haustus, quartâ quâque horâ sumendus. [An anodyne expectorant in bronchitis.]

2. ℞. Mistur. acaciæ, ℥j; tinct. hyoscyami ʒij; oxymel. scillæ ʒij; aquæ ʒiv. M. sumat cochl. j majus subinde. [Anodyne expectorant in bronchitis.]

3. ℞. Oxymel. scillæ, spirit. æther. nitros. tinct. camphor. comp. āā ʒiv. M. sumat cochl. j. min. pro dosi. [A good expectorant in cases of hoarseness, catarrh, &c.]

4. ℞. Oxymel. scillæ, mistur. acaciæ syrup. tolut. āā ℥ss; tinct. opii ♏xx. M. sumat. ʒj. frequenter in die. (A good mixture in bronchitis, with irritability of the mucous membrane.]

5. ℞. Gum. myrrh. ʒss; solve in aq. puræ ℥j, et adde lactis ammon. ℥iv; oxymel. scillæ ℥ss; tinct. camph. comp. ℥j. M. capiat cochl. amplum pro dosi. [A good stimulating expectorant in cases of chronic catarrh, when the patient is unable to spit up the secreted phlegm.]

6. ℞. Decoct. polygalæ senegæ ℥viij; ammon. sesquicarb. ʒj; oxymel. scillæ ʒvj; tinct. camph. comp. ℥ss. M. sumat cochl. ij. magna quartâ quâque horâ. [A good expectorant and tonic, in chronic catarrh, after all inflammatory symptoms have been subdued.]

7. ℞. Lact. ammon. ℥v; oxymel. scillæ ℥ss; tinct. digital. ♏xxx. M. capiat cochl. amplum subinde, vel tusse urgenti. (This combination is found to afford relief in catarrh, accompanied with dyspnœa.)

8. ℞. Resinæ balsam. copaib. ʒss; extr. hyoscyami gr. xij; quinæ disulphat. gr. vi. Fiant pilulæ duodecim; sumat unam ter in die. (In chronic bronchitis with excessive secretion.)

9. ℞. Nitrat. potass. ℈ii; mist. acaciæ ℥ss; syrupi papav. albi ʒij; mist. amygd. ℥vi; vini ipecac. ʒi. M. sumat cochlearia tria ampla quartis horis. [A good expectorant in bronchitis.]

10. ℞. Pulv. ipecac. comp. gr. xxv; quininæ di sulph. gr. vj; pulv. acaciæ ℈j; extract. lactucæ ℈j; syrup. papav. q. s. M. fiant pil. xviij, quarum capiat binas ter quotidie.

11. ℞. Solut. hydroch. calcis ♏xxv; mistur. camphor. ʒx; tinct. opii camph. ʒss. M. fiat haustus, ter die capiendus. (Stimulating expectorants in chronic bronchitis.)

12. R. Mistur. cretæ ℥vj; vini ipecac. ʒiss; tinct. camphor. comp. ʒvj; syrup. tolut. ʒiij. M. capiat cochl. ij larga ter quaterve in die. (In chronic bronchitis, when colliquative sweats or diarrhœa occur.)

13. ℞. Mistur. amygdal. amar. ℥v; vin. ipecac. tinct. scillæ āā ʒj; syrup. tolut. ʒvj. M. sumat cochl. magnum urgente tussi. (In humoral asthma, and the latter stage of catarrh.)

14. ℞. Ol. amygdal. dulc. ℥iss; vitel. ovi unius; aquæ flor. aurant. ℥v; mist. acaciæ ℥ss; vin. ipecac. ʒiss; syrup. altheæ ℥ss. M. capiat cochl. amplum frequenter. (A soothing expectorant in tickling coughs.)

15. ℞. Decoct. cinchon. ℥iiiss; liquor. ammon. acet. ℥iss; mist. acaciæ ℥ss; spirit. æther. nitros. ʒiis; tinct. camphor. comp. ℥ss; extract. conii gr. xx; syrup. tolut. ℥ss. M. capiat cochl. unum amplum secundâ vel tertiâ quâque horâ.

16. ℞. Decoct. polygalæ senegæ ℥viij; tinct. camph. comp. ʒvj; oxymel. scillæ ℥j; vin. ipecac. ℥ss; ammon. subcarb. ℈ij. M. fiat mistura. capiat æger cochl. ij magna quartâ quâque horâ. (These are excellent tonic expectorants in cases of chronic bronchitis. They promote the expulsion of phlegm from the bronchi.)

17. ℞. Extract. hyoscyami gr. iv; tinct. scillæ ♏x; spirit. anisi ʒiss; aquæ anisi ℥iss; acidi. nitrici ♏vj. Fiat haustus. (May be given occasionally to promote expectoration in chronic bronchitis attended with dyspnœa.)

18. ℞. Pulv. ipecac. gr. j; camphoræ gr. j; extract. conii gr. iv. mist. acaciæ q. s. Fiant pil. ij ter die capiendæ. Vel:

19. ℞. Zinci sulph. gr. vj; massæ pil. galban. comp. ℈j; extract. conii ʒss; syrup. q. s. Fiant pil. xviij quarum capiat binas ter in die. (In chronic bronchitis when the pulse is soft, and not very frequent, and the sputum very abundant and consisting chiefly of mucus.)

20. ℞. Aquæ menth. ℥i; mist. acaciæ ℥ss; liquor. antim. potassio-tartrat. ʒi—ʒij; syrup. limon. ʒij; tinct. op. gtts. ij. ʒi—ʒij secundis horis. (This is an effectual expectorant in the pneumonia of children. When much depression attends its use, a few drops of spirit of lavender, or tincture of cinnamon, may be added.

21. ℞. Aquæ fœniculi ℥iss; tinct. scill. ʒiss; sod. carbon. gr. xij; syrup. tolut. ʒij; syrup. croci ʒij; tinct. camph. comp. ʒss. M. ʒi—ʒij tertiis horis. (This is found very beneficial in spasmodic coughs, with chronic bronchitis and secretion of viscid phlegm in the case of children.)

22. ℞. Decoct. polygal. seneg. ℥i. aq. ammon. acetat. ℥ss; syrup. scill. ʒij; syr. papav. albi ʒij. ʒi—ʒij tertiis horis. [A stimulating expectorant in the advanced stage of bronchial inflammation in children.]

23. ℞. Decoct. polyg. seneg. ℥iiss; oxymel. scill. ʒij; vin. ipecac. ʒij; antim. potassio-tartrat. gr. i. M. ♏x—♏xx omni horæ quadrante ad emesin—omni bihorio ad expectorationem promovendam.

24. ℞. Balsami Peruviani ʒij; ovi unius vitellum; tere simul et adde aquæ cinnam. ℥viss; tinct. al. comp. ʒiij; syrupi croci ʒij; fiat mistura. Sumat ℥iss bis quotidie. (Dr. Paris has found this a useful combination in sluggish states of the intestinal canal.)

25. ℞. Balsami Peruviani ʒi; mist. acaciæ ʒij; syrup. papav. albi ʒi; mist. amygd. ʒx. M. fiat haustus ter in die sumendus. [This has been found very efficacious in the treatment of chronic bronchitis.)

26. ℞. Lact. ammon. ℥ss; oxymel. scillæ ʒiss; vin. antim. ♏xv; tinct. camph. comp. ʒss. M. fiat haustus ter die sumendus. Vel:

27. ℞. Decoct. hordei ℥iv; potass. nitr. pur. ʒss; antim. tart. gr. i; oxymel. scillæ ʒij; tinct. camph. comp. ʒiss. M. fiat mistura, cujus sumat cochl. magn. j. sæpe per diem. (These are good expectorants in croup.)

28. ℞. Gum. ammon. ℥j; solve in aq. pulegii ℥iv; et adde acet. scillæ ʒiij; syrup. tolut. ℥ss. M. fiat mistura, sumat cochl. ij. pro dos. subinde. (A good expectorant in chronic coughs.)

29. ℞. Mistur. amygdal. ℥v; vini ipecacuan. tinct. scillæ āā ʒj; syrup. tolut. ʒvj. M. sumat cochleare magnum urgente tussi. (Given in humoral asthma, and in the latter stage of catarrh.)

30. ℞. Mistur. ammoniaci ℥iv; liquor. antimon. tart. ʒij; tinct. camphor. comp. ℥ss; syrup. tolut. ℥j. M. capiat cochl. unum pro re natâ. (This a good stimulating expectorant in chronic pituitous asthma.) Vel:

31. ℞. Mistur. ammoniaci, aq. destil. lauro-cerasi āā ℥iiss; tinct. castor. ʒiij; tinct. camphor. comp. ʒij; syrup. tolut. ℥j. M. fiat mist. cujus sumat cochleare unum amplum subinde. Vel:

32. ℞. Balsam. tolut. ʒiss; mist. acaciæ ℥j; tere bene et adde tinct. benzoin. comp., tinct. camphor. comp. āā ʒiij;

ol. anisi ♏xx; aquæ pulegii et aquæ anethi āā ℥ii.; syrup. simpl. ʒij. M. capiat cochl. ampla duo quater in die.

33. ℞. Tinct. scillæ ♏xv; acidi. nitric. dilut. ♏viij; aquæ pulegii ℥iss; spirit. æther. nitros. ʒss; extract. hyoscyami gr. iij; syrup. tolut. ʒj. M. fiat haustus, tertiis vel quartis horis sumendus. (This is a good expectorant in chronic asthma.)

34. ℞. Lact. ammon. ℥v; oxymel. scillæ ℥ss; tinct. camph. comp. ʒiij. M. fiat mistura, cujus sumat cochl. larg. ij. quartâ quâque horâ. (A good attenuating expectorant for promoting the secretion of mucus in the lungs, in cases of chronic catarrh.)

35. ℞. Pulv. scillæ gr. xxx; ammon. gum. res. ʒiss; extr. conii gr. xxx. Contunde simul, et div. massam in pil. æquales triginta, quarum sumat duas sextis horis. (These pills are given with advantage in asthma and chronic catarrh.)

36. ℞. Gum. ammon., gum. arab. sacchar. albi āā ʒij; bals. copaib. ʒss; aq. cinnam. ℥iv. Sumat cochleare parvum omni sesquihorâ. (In dry bronchitis, accompanying dropsy.)

37. ℞. Lact. ammon. ℥iv; oxymel. scillæ ʒiij; vin. antim. ♏j; acet destillat. ℥ss. M. fiat mistura, cujus sumat cochl. ij. subinde. (This is a good mixture for expelling the mucous matter by which the lungs are often loaded in cases of asthma.)

38. ℞. Aquæ destillat. ℥i; mist. acaciæ ℥ss; vin. ipecac. ʒij; syrup. lim. ʒi; syrup. papav. somnif. ʒi. M. ʒi. horis secundis. (This is a mild expectorant for young children in bronchitis.)

39. ℞. Sodæ sesquicarb. gr. xxiv; vin. ipecac. ʒi; tinct. opii ♏vj; syrupi ʒiij; aquæ puræ ℥j. M. sumat partem sextam sextâ quâque horâ. (This mixture may be given as an expectorant in hooping cough.)

40. ℞. Decoct. polygal. ℥viij; tinct. camphor. comp. ℥i; syrupi zingib. ℥ss; mist. acaciæ ℥i; sumat ℥j; tertiis vel quartis horis. (A good tonic expectorant in typhoid pneumonia.)

41. ℞. Ammon. sesquicarb. gr. xv; succi limon. recent. ℥ss; aquæ ʒij; oxymel. scillæ ʒj; spirit. æther. sulph. ʒss; pulv. acaciæ gr. v. M. fiat haustus, ter in die repetendus. (A mild expectorant in phthisis.)

42. ℞. Decoct. lichen. ℥xj; vin. ipecac. ʒij; extract. conii ℈j; ol. anisi ♏xij; syrup. altheæ et syrup. papav. āā ʒiij; M. capiat cochl. iij. vel iv. quater in die. (Expectorant in coughs and colds.)

SIALOGOGUES.

The most powerful though indirect sialogogues being the different preparations of mercury, we refer to the head of Alteratives for the different formulæ of them. We shall confine ourselves here to a few formulæ of the more direct sialogogues.

1. ℞. Pyrethri rad. contrit.; mastiches āā ʒi. Fiant secundum artem masticatoria duo—teneat æger in ore, et manducet, et exspuat salivam. (This has been found useful in toothache and paralysis of the tongue.)

2. ℞. Zingib. radicis contritæ ʒss; mastiches ʒiss. Fiant ad ignem sex pastilli: teneat unum in ore æger. (For the same uses as the preceding.)

3. ℞. Pyrethri rad. ℥ss; acid acetici tenuis ℥vi; opii gr. iij. Vase operto in balneo arenæ per horam macera; liquoris colati cochleare aliquandiu ore retinendum est, ac postea exspuendum. (In toothache.)

4. ℞. Acidi nitrici ʒi; aquæ destill. ℥xxiv; syrup. ℥ij. M. sumatur partitis dosibus intra nycthemeri spatium. (As an antisyphilitic.)

DILUENTS AND DEMULCENTS.

1. ℞. Sem. hordei decortic. ℥ij; aquæ Oiv; decoque ad Oij. et cola. [A useful diluent in febrile diseases.]

2. ℞. Decoct. altheæ offic. ℥vj; syrupi ℥j. Fiat mistura, cujus sumatur tertia pars sextâ quâque horâ. [In calculous cases, and inflammation of the kidneys.]

3. ℞. Mistur. amygdal. ℥j; tinct. opii ♏iv; liquor. ammon. acet. ʒij. M. fiat haustus, quartâ quâque horâ sumendus. [This is an excellent demulcent in disease of the mucous membrane of the intestines, with griping and tenesmus.]

4. ℞. Spermatis-ceti ʒij; vitel. ovi q. s. ad solut. aq. pulegii ℥iv; oxymel. scillæ ʒiij; syrup. tolut. ʒij. M. fiat mistura, cochl. ij. pro dos. tussi urgenti sumenda. [A useful demulcent in cases of cough, with tightness of the chest, in fever and inflammatory affections.]

5. ℞. Mist. acaciæ, aquæ font. āā ℥iij; nitrat. potass. purif. ʒj; vin. antim. ♏x; syrup. limon. ℥ss. M. fiat mistur. capiat cochl. ij pro dosi tertiâ quâque horâ. [It relieves the hard cough so common in some cases of fever.]

6. ℞. Cetacei ʒij; vitel. ovi; syrup. altheæ ℥ss; aquæ cinnam. ℥iss; aq. destillat. ℥iij. M. sumat cochl. unum amplum frequenter. [A good demulcent in chronic bronchitis.]

7. ℞. Mistur. amygdal. ℥vij; potass. nitrat. gr. vj; tinct. digital. ♏vj. syrup. tolut. ʒj. Fiat haustus. [This draught may be taken every six hours, when cough continues with quick pulse, in the sequelæ of measles, in children somewhat advanced in years.]

8. ℞. Mist. acaciæ ʒv; ol. amygdal. dulc. ℥j; syrup. tolut. ℥ss; aq. ammon. ʒss. M. fiat mistura, cujus sumat cochl. larg. j pro dosi. [A useful demulcent in cases of catarrh attended with rawness and soreness in the fauces.]

9. ℞. Decoct. hordei ℥iv; lact. ammon. ℥ij; acet. scillæ ʒij; syrup. tolut. ʒiij. M. fiat mistur. cujus sumat cochl. j. vel. ij. tusse urgenti. [This mixture relieves the troublesome cough in the first stage of phthisis.]

10. ℞. Ol. amygdal. dulc. mist. acaciæ āā ℥ij; aq. font. ℥iij; syrup. altheæ ℥j; vin. antim. ♏xxx. M. fiat mistura. [This is a useful demulcent in consumptive cases.]

11. ℞. Spermaceti ʒij; vitel. ovi q. s. ad solut. et adde aq. pulegii ℥v; potass. nitrat. pur. ℈j; syrup. tolut. ℥ss. M. fiat mistura. [Two tablespoonsful of this mixture may be taken every three or four hours in the laryngeal cough so often met with in phthisical subjects.]

12. ℞. Decoct. hordei lbij; mist. acaciæ ℥iv; syrup. limon. ℥iss. M. fiat potus. [To allay the hoarseness and tickling cough often accompanying affections of the lungs and air passages.]

13. ℞. Gelatin. amyli ℥v; mist. acaciæ ℥ss; ol. olivæ ℥ss; tinct. opii ♏xxx. M. fiat enema. [This is an excellent sedative and emollient lavement in dysentery with abrasion of the rectum.]

14. ℞. Infus. lini comp. ℥iv; tinct. camphor. comp. ʒiij; aq. flor. aurant. ʒx. M. sumat cochl. ij. majora ter indies. [A good demulcent in chronic bronchitis.]

15. ℞. Ichthyocollæ ℥ii; aquæ Oij; decoque ad Oj; cola et adde lactis Oj; sacchari purific. ℥i. [This is demulcent and nutritive.]

16. ℞. Spermaceti ℥ss; vitel. ovi. q. s. terantur in mortario marmoreo, et adde aq. pulegii ℥j; aq. fontan. ℥iv; potass. nitr. pur. ʒj; syrup. tolut. ʒij; tinct. opii ♏l. M. fiat mistura, cujus sumat cochl. magna iij. tertiâ quâque horâ. [This is a good demulcent and sedative in vomiting of blood, after inflammatory action has been somewhat subdued by bleeding, &c.]

ABSORBENTS, ANTACIDS, ALTERATIVES, DEOBSTRUENTS, &c.

1. ℞. Cretæ prep. gr. x; pulv. ipecac. gr. iij; aq. menth. virid. ʒx. M. fiat haustus, tertiâ quâque horâ repetendus. [This is found useful when there is much acidity of the stomach.]

2. ℞. Magnes. calcin. ʒj; aq. puræ ℥v; spirit. cinnam. ʒiij; aq. ammon. pur. ʒj. M. capiat cochl. ij. pro re natâ. [A good absorbent in the aphthous affections of children.]

3. ℞. Cretæ prep. gr. xv; aq. nucis. mosch. ℥ss; aq. font. ℥j; syrup. zingib. ʒij. M. fiat haustus, bis die sumendus. [This is a good absorbent in dyspepsia when there is a redundance of acid in the stomach, causing heartburn.]

4. ℞. Liquor calcis ʒxj; confect. aromat. gr. xv; magnes. carbon. gr. vj; tinct. lupuli ʒj. M. fiat haustus, ter in die repetendus. [This is found beneficial in chronic dysentery, when there is nausea with acidity.]

5. ℞. Mistur. cretæ ℥iv; spirit. cinnam. ʒj; aq. ammon.

pur. ʒj ; tinct. opii ♏xxx. M. sumat æger cochl. ij. vel. iii. pro re nata. [This is given with advantage in diarrhœa depending on acid in the stomach and intestines.]

6. ℞. Magnesiæ ʒj ; aquæ menth. pip. ℥iss ; tinct. aurantii ʒj. M. fiat haustus, pro re natâ sumendus. [A good remedy in heartburn, and other cases of acidity of the stomach.]

7. ℞. Liquoris ammoniæ, ♏xvi ; mistur. amygdal. ℥ij ; tinct. opii ♏x. M. fiat haustus, ter die sumendus. [In acidity of the primæ viæ.]

8. ℞. Pulv. cretæ comp. ʒss ; pulv. acaciæ ℈ji ; syrup. papav. ʒij ; aq. anethi ʒx ; spirit. ammon. aromat. ♏xx. M. fiat mistura. [The child may frequently take a teaspoonful of this mixture in aphtha.]

9. ℞. Liquor. calcis ℥v ; magnesiæ calcin. ℈j ; spirit. ammon. aromat. ʒij ; tinct. card. comp. ʒvj. M. sumat cochl. ij. larga bis die, vel sæpius. [A good remedy in case of heartburn.] Or the following :

10. ℞. Sodæ carb. exsic. ℈j ; pulv. rhæi gr. vj ; pulv. zingib. gr. iv. M. fiat pulvis, urgente gastrodynia sumendus.

11. ℞. Magnes. calcin. gr. viij ; pulv. rhæi, pulv. columbæ, pulv. cinnam. comp. āā gr. iv. M. fiat pulvis, bis in die sumendus. [In gastrodynia.]

12. ℞. Sodæ carbon. gr. xv ; tinct. rhæi ℥ss ; aq. menth. pip. ℥j. M. fiat haustus.

13. ℞. Pulv. ipecac. comp. gr. vj ; hydrarg. cum creta gr. iv. Fiat pulvis, omni nocte sumendus. [In diarrhœa depending on disease of the mucous membrane of the intestines.]

14. ℞. Potassii iodidi gr. iij ; syrupi ʒj ; aquæ cinnam., aq. puræ āā ʒv. M. fiat haustus, bis die sumendus. [This is sometimes given as an alterative and deobstruent in chronic peritonitis.]

15. ℞. Hydrarg. cum. creta gr. vj ; pulv. ipecac. gr. ij ; sacchar. purif. gr. xij. M. sumat partem quartam sextis horis. [A useful alterative in the aphthæ of infants.]

16. ℞. Subm. hydrarg. gr. xxiv ; opii purif. gr. xj ; antimon. tart. gr. ij ; mist. acaciæ q. s. Fiant pil. xjj ; e quibus sumatur una bis in die. [This has been found a useful alterative pill in secondary venereal symptoms.]

17. ℞. Pulv. Doveri gr. viij ; hydrarg. chlorid. gr. ss ; confect. aromat. q. s. Fiant pilulæ duæ, post singulas sedes liquidas sumendæ. [These pills may be given in the diarrhœas attending on injuries of the spine, gangrenous affections, and bad compound fractures.]

18. ℞. Chlorid. hydrarg. gr. j ; pulv. Jacobi gr. ij ; opii pulv. gr. ¼ ; conserv. rosæ, q. s. Fiat pil. sextis horis repetenda cum haustu salino. [This is a good form for administering calomel in pneumonia]

19. ℞. Pulv. jalapæ, pulv. rhæi, pulv. calumbæ, potassæ bitart. āā ʒj ; ferri sulph. gr. x ; aquæ menth. pip. ℥jx ; tinct. sennæ comp. ℥ss. M. sumat cochl. ij, majora mane et meridie. [This mixture is recommended by Mr. Twining in congestion of the spleen.]

20. ℞. Camphoræ pulv. ipec. comp. āā gr. j ; extract. colocynth. comp. gr. iij. M. fiat pilula. [To be taken with each dose of the above mixture in congested spleen.]

Dr. Williams employs the bromide of potassium in congested spleen according to the following formula :—

21. ℞. Bromidi potassii gr. iij ; mistur. camphoræ ℥j. M. fiat haustus, ter die sumendus.

GARGLES, LINIMENTS, OINTMENTS, &c.

1. ℞. Infus. rosæ ℥vj ; alum. purif. ʒiss ; mel. optim. ℥j. M. fiat gargarysma. [This is an excellent astringent wash for clearing away the sloughs in aphthous affections of the throat and fauces.] Or the following :

2. ℞. Decoct. hordei. comp. ℥vj ; mel. rosæ ℥j ; alum. purif. ʒj ; tinct. myrrh. ℥ss. M. fiat garg.

3. ℞. Decoct. hordei ℥vj ; mel. rosæ ℥j ; tinct. opii ʒj. M. fiat gargarismus. [A useful antiseptic wash in venereal sore throat.]

4. ℞. Hydrarg, bichloridi gr. iij. solve in spirit. vin. rect. ℥ss et adde decoct. cinchon. ℥vj ; tinct. myrrh. mel. rosæ āā ℥ss. M. fiat gargarismus. [To be frequently used in venereal ulcerations of the throat and fauces.]

5. ℞. Hydrarg. bichloridi gr. iij. solve in spirit. vin. ten. ℥ss.

et adde decoct. cinchon. ℥vj; tinct. myrrh. ℥vj; mel. rosæ ℥ss. M. fiat lotio. [This is a good detergent lotion in foul ulcerations of the nose and palate.]

6. ℞. Mel. rosæ ℥j; decoct. hordei ℥x; tinct. myrrhæ ʒss; acet. opt. ℥j. M. fiat garg. [In putrid sore-throat for loosening and washing away the sloughs.]

7. ℞. Spirit. camphorat. ℥j; aq. ammoniæ ʒij; tinct. cantharid. ʒss. M. fiat linimentum. [This is found useful when rubbed with a warm hand over the diseased part, in mumps and other glandular swellings.]

8. ℞. Potassæ nitrat. ʒij; mellis rosæ ʒiv; infus. rosæ ℥v. M. fiat gargarisma sæpe utendum. [Used in inflammatory sore-throat.]

9. ℞. Chloridi zinci ʒj; farinæ ʒiv. M. [By wetting this powder with a few drops of water, a very caustic paste is formed, of great efficacy in lupus.]

10. ℞. Iodidi barii gr. iv; adipis præpar. ℥i. M. fiat unguentum. [Used for discussing scrofulous tumours.]

11. ℞. Iodidi arsenici gr. iij; adipis ℥i. M. fiat unguentum. [This has been used in cancer, lupus, &c. The greatest caution is required in its use.]

12. ℞. Aceti, spiritus tenuioris, āā Oss. aluminis ʒij; misceantur, ut fiat embrocatio. [For chilblains.]

13. ℞. Liquoris ammoniæ acetatis, aquæ destill. spirit. rectif. āā ℥j. M. (For phlegmonous inflammation.)

14. ℞. Liquoris ammoniæ acetatis, liniment. sap. comp. āā ℥i; liquor. ammoniæ ℥ss. M. ut fiat embrocatio. [For sprains.]

15. ℞. Plumbi carbonatis ʒi; trag. pulv. comp. ʒij.; opii pulv. ℈j; aquæ fervent. Oj. M. [An injection in the first stage of gonorrhœa.]

16. ℞. Aluminis ʒi; aquæ ros. ℥iv. M. [An injection in fistulæ, gleets, &c.]

17. ℞. Bals. copaib. ʒij; mist. acaciæ ℥ss; misce, et adde aq. calcis ℥iv. Fiat injectio. [In ulceration of the rectum, urethra, or vagina.]

18. ℞. Decocti quercus lbi ; alum. purif. ℥ss. M. [An injection in ulceration of the rectum or vagina.]

19. ℞. Liquor. ammon. ℥i ; olei olivæ ℥iss. ; ol. tereb. ℥ss. M. [A useful liniment in cases of indolent inflammation.]

20. ℞. Opii purif. ℥iss ; alcohol. dilut. lb. i ; digere per septem dies, et adde aquæ ammoniæ ℥ij. [For stiff and painful swellings of the joints.

21. ℞. Œrugin. præparat. pulv. calomelanos āā ʒi ; cerati resinæ ℥i ; tereb. Venetæ ℥ij. M. fiat unguentum. [An ointment recommended by Williams in ringworm.]

22. ℞. Conii folior. contus. lb. i ; adipis præparat. lb. iss. M. fiat unguentum. [In the treatment of irritable scrofulous sores.]

23. ℞. Gallar. pulv. ʒj ; opii purif. duri pulv. ʒij ; liq. plumb. acet. ʒij ; adip. præparat. cerati cetacei āā ℥i. M. fiat unguentum. [In hæmorrhoids.]

24. ℞. Olei olivæ optimi., aq. calcis. āā Ʒiij ; unguent. nitr. hydrargyri (mitis) ʒij. Fiat unguentum. [In irritable ulceration of the nose, face, &c.]

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